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Development Planning and Research
Associates, Inc., Manhattan, KS

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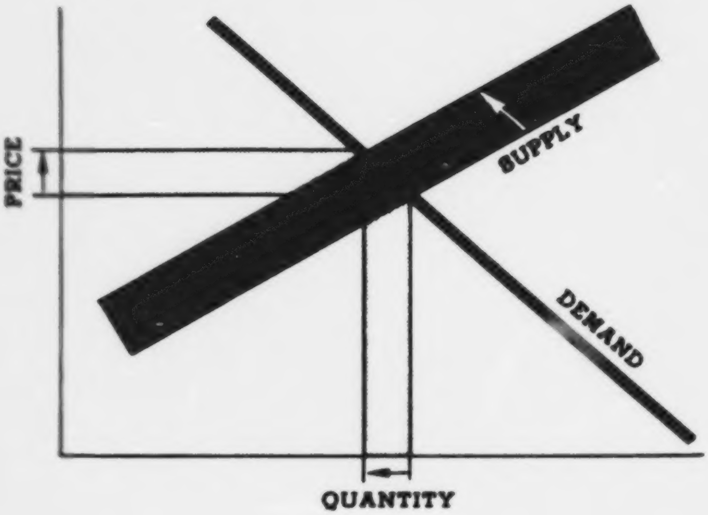

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The US Environmental Protection Agency issued effluent guidelines and limitations for the Textile Mills Industry in September 1982. This report estimates the economic impact of pollution control costs in terms of price changes, effects on profitability, potential plant closures, unemployment, and other secondary effects. A model plant approach is used to assess these impacts for nine subcategories, which are based on size of plant and type of textile process.

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P.O. Box 727, Manhattan, Kansas

ECONOMIC IMPACT ANALYSIS OF EFFLUENT LIMITATIONS AND STANDARDS FOR THE TEXTILE MILLS INDUSTRY

By
Donald J. Wissman
Richard E. Seltzer
Arthur C. Barker

Prepared for
U.S. Environmental Protection Agency
Office of Analysis and Evaluation
Washington, D.C. 20460

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PREFACE

This document is a contractor's study prepared for the Office of Water Regulations and Standards of the Environmental Protection Agency (EPA). The purpose of the study is to analyze the economic impact which could result from the application of effluent standards and limitations issued under Sections 3-1, 304, 306 and 307 of the Clean Water Act to the textile industry.

The study supplements the technical study (EPA Development Document) supporting the issuance of these regulations. The Development Document surveys existing and potential waste treatment control methods and technology within particular industrial source categories and supports certain standards and limitations based upon an analysis of the feasibility of these standards in accordance with the requirements of the Clean Water Act. Presented in the Development Document are the investment and operating costs associated with various control and treatment technologies. The attached document supplements this analysis by estimating the broader economic effects which might result from the application of various control methods and technologies. This study investigates the effect in terms of product price increases, effects upon employment and the continued viability of affected plants, effects upon foreign trade and other competitive effects.

The study has been prepared with the supervision and review of the Office of Water Regulations and Standards of EPA. This report was submitted in fulfillment of Contract No. 68-01-4632 by Development Planning and Research Associates, Inc. The analysis was completed in November 1981.

ACKNOWLEDGEMENTS

This report represents the second phase of work to analyze the economic impact which may result from the application of effluent regulations on the textile industry. The initial report covering the proposed standards was published in October 1979. The work covering both reports was conducted by a research team from Development Planning and Research Associates, Inc. (DPRA) with Mr. Donald J. Wissman serving as the DPRA principal responsible for the project. Mr. Richard E. Seltzer acted as Project Director for the earlier report and Mr. Wissman acted in that capacity for this phase of the study. Much of the detailed analysis was completed by Mr. Arthur C. Barker of DPRA, assisted by Ms. Sabrina Crooke.

DPRA especially acknowledges contribution of Ms. Mary Brazell Ives and Ms. Debra Maness, U.S. Environmental Protection Agency, Office of Water Regulations and Standards, who served consecutively as the Project Officers for this phase of the study. Their assistance and guidance in all aspects of this project were invaluable. We also want to recognize the contribution of Mr. James R. Berlow, U.S. Environmental Protection Agency, Effluent Guidelines Division and Mr. Larry J. Oliver, Sverdrup and Parcel and Associates, Inc., who provided information pertaining to the wastewater treatment technologies and associated costs utilized in this study.

The cooperation and assistance of the industry trade associations are acknowledged for their assistance in supplying information on a large and complex industry. In particular, the following individuals and associations have been helpful: Ms. Maggie Dean, Mr. George Wino and Mr. O'Jay Niles of the American Textile Manufacturers Institute; Mr. Karl Spilhaus of the Northern Textile Association; and Mr. Barry Torrence of the Carpet and Rug Institute.

Finally, the many textile mill owners and managements who submitted information and cooperated during staff interviews are acknowledged and thanked for their cooperation.

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(AND TRANSMITTAL LETTER)

EXECUTIVE SUMMARY

A. Introduction

This report analyzes the economic impacts of the imposition of water pollution controls on the Textile Mills Point Source Category (textile industry). Prepared under the supervision and review of the Office of Analysis and Evaluation, U.S. Environmental Protection Agency, the study, as required under the Clean Water Act, considers the economic effects of the controls imposed by that law over the industry's discharge of its effluents.

The specific economic impacts analyzed in this study include:

1. prices, profitability, and growth,
2. extent and determinants of capitalization,
3. number, type, and size of plants,
4. production and employment, and
5. community and balance-of-trade effects.

To determine the industry's water pollution control cost impacts, the study describes the industry's structural, financial, and pricing characteristics, develops representative model plants; and determines the economic impacts of control costs (supplied by EPA) on the models.

B. General Approach

The general approach employed in this study was to analyze the textile industry for its structure and subcategorization, plant and employment characteristics, financial profile, and pricing patterns. This analysis provided the framework for developing model plants to represent the financial profiles of typical plants, with respect to subcategory, size, and type of operation. The model plant concept facilitated the design of appropriately sized treatment systems, the incorporation of treatment costs into the model profiles, and the projection of these profiles into the future. By using the net present value (NPV) methodology, microeconomic effects such as potential closures and price increases could be determined. Macroeconomic impacts on the industry could then be analyzed for effects on employment, production, communities and balance of payments.

Data utilized in this study were obtained from both primary and secondary sources. Primary data was acquired directly from the industry through surveys conducted under the authority of Section 308 of the Clean Water Act of 1972 as amended by P.L. 95-217 (the Clean Water Act of 1977). An initial survey was made in 1977, and a follow-up survey occurred in 1979. Secondary data was obtained from published sources including development documents, previous textile studies, industry publications, and pertinent financial reports.

C. Background of the Industry

The textile industry is comprised of a diverse group of establishments varying in size, process, and product. The general characteristics of the industry establishments range from small family-owned mills utilizing traditional manufacturing and managerial practices to large multi-mill corporations who rely on the latest managerial and sophisticated process practices available. These establishments are principally engaged in receiving and preparing fibers; transforming these materials into yarn, thread, or webbing; converting the yarn into fabric or related products; and dyeing and finishing these materials at various stages of production. The final products produced by textile establishments range from twine and tire cords to carpets, blankets, lace and fabrics for apparel.

The industry has been categorized by establishment according to the manufacturing functions performed at the facility. This functional approach, developed in previous EPA studies, is applicable to this study since in enables the industry establishments to be grouped into "subcategories" with similar processing characteristics. Subcategories include:

1. Wool Scouring
2. Wool Finishing
3. Low Water Use Processing
4. Woven Fabric Finishing
    a. Simple Processing
    b. Complex Processing
    c. Desizing
5. Knit Fabric Finishing
    a. Simple Processing
    b. Complex Processing
    c. Hosiery Products
6. Carpet Finishing
7. Stock & Yarn Finishing
8. Nonwoven Manufacturing
9. Felted Fabric Processing

Production, capacity and utilization within the textile industry closely parallel the general economy. Total U.S. mill fiber consumption has increased at a rate of about 3.5 percent during the past 15 years. In recent years the increase has slowed to under two percent annually. While total production has been fairly stable, as reflected in the rate of consumption of fiber, consumption by types of fiber has changed dramatically. Cotton consumption has declined from over 4 billion pounds in 1965 to 3 billion pounds in 1978; consumption of wool is less than one third of its level in the early 1960's. While the consumption of natural fibers has declined, the consumption of man-made fiber has nearly tripled during the period.

Sales were $20 billion in 1967 and increased to over $45 billion in 1980. Although the value of shipments of the textile industry accounts for about 3 percent of the shipments from all manufacturing industries, profits have been less than 2 percent of the manufacturing industries. The after tax return on total assets has ranged from 4-6 percent over the 1970-1980 period compared with a 7-8 percent return for all manufacturing. Return on equity has ranged from 4 percent in 1975 to 12 percent in 1979 compared with the average of all industries of 9-15 percent.

In the past, the textile industry's pricing process was depicted as the closest model of pure competition existing in the major manufacturing industries in the U.S. Today, however, the competitive environment has changed, and accordingly the applicability of pure competition has been reduced. While the available supply and market demands for specific textile goods are major determinants of the price of the goods, numerous other factors, such as the supply structure, character of the product, product specialization and international competition have considerable influence on the actual price received by the textile manufacturers. In addition, demand determinants for textile end-use products include several fundamentally important variables which are altogether outside manufacturers' control (e.g., housing starts, per capita disposable income, total employment). Briefly, price determination for textile goods is highly complex and dynamic.

D. Representative Model Plants

Model plants were developed to represent mills and plants - both existing and new sources - which could be affected by the imposition of effluent control guidelines. Models were based on the production sizes and subcategories contained in the Development Document. In addition to the functional subcategorization with its focus on mill waste characteristics, models were further segmented into type of mill in order to reflect economic characteristics associated with product ownership and extent of integration. Types include commission finishers, own fabric (finishers), and integrated mills. The "commission" models represent those plants which are engaged in job finishing on a commission or fee basis; they do not purchase the textiles processed. The own fabric finishers are similar to commission plants with respect to the processes accomplished but differ in economic aspects. These plants either purchase the textile inputs or are plants within multiplant firms which are vertically integrated. The "integrated" models represent those mills engaged in both gray milling and finishing operations. Models were developed for each type of mills because of the significant differences in the financial profiles and the ability to absorb pollution control costs.

E. Wastewater Control Costs

The wastewater control costs considered in this study were provided in the Development Document and developed for direct and indirect dischargers, both existing and new source plants. The discharge status of the industry was based on survey data reported by the Technical Contractor in the Development Document. An estimated 80 percent of the wet processors (indirect dischargers) are discharging to publicly owned treatment works (POTW) while the remaining 20 percent (direct dischargers) are discharging to surface or receiving waters. Of all the 1,126 wet processors in the industry, it is estimated only about 20 percent would be affected by the guidelines. Ten percent of the direct dischargers have advanced treatment systems while most of the remainder have biological treatment (BPT) systems in-place. Only about 10 percent of the indirect dischargers are discharging wastes which would require them to add pretreatment controls; these wastes are those that contain heavy metals.

A broad range of alternative treatment technologies were considered. These included chemical coagulation, filtration, flotation, activated carbon adsorption and ozonation. After cost analyses (described in the Development Document), the more sophisticated technologies such as ozonation were excluded from further consideration because they were either too costly or energy intensive. (However, they are included in this analysis to demonstrate their impacts). The remaining technologies were selected as proposed treatment options for a detailed analysis. From these proposed options, EPA has recommended specific options to be used in establishing limitation guidelines and performance standards.

These options include the following:

- Best Available Technology Economically Achievable (BAT) (Direct Dischargers):

  Water jet weaving (Option 1) - biological treatment
  Wool finishing (Option 4) - biological treatment plus chemical coagulation plus multimedia filtration
  Felted fabric processing (Option 1) - biological treatment
  All others (Option 2) - biological treatment plus multimedia filtration.

- Pretreatment Standards for Existing Sources (PSES) (Indirect Dischargers):

All subcategories (Option 2) - preliminary treatment plus chemical coagulation.

- New Source Performance Standards (NSPS):

  All subcategories (Option 2) - biological treatment plus chemical coagulation plus multimedia filtration.

- Pretreatment Standards for New Sources (PSNS):

  All subcategories (Option 2) - segregation of toxic pollutant waste stream from the waste stream. Preliminary treatment plus chemical coagulation of toxic pollutant waste stream and screening for other waste streams.

In addition to an analysis of the costs for the above options, an analysis was also conducted of the costs of the Resources Conservation and Recovery Act (RCRA).

Table 1 shows the number of plants in the industry expected to incur costs for wastewater control and total costs. These costs include investment requirements, operating and maintenance (O&M) costs, and annualized cost. Of a total of 1,126 wet processors in the industry (excluding gray mills), 305 are expected to incur costs. The total investment requirement for these 305 plants is estimated to be $122.7 million while O&M and annualized costs are estimated at $39.9 and $65.5 million, respectively.

F. Financial and Economic Impacts of Recommended Control Options

Economic and financial impacts were assessed for the various sizes and types of plants in the major subcategories using a model plant approach. Impacts on all alternatives were assessed and discussed in the body of this report. However, only those impacts relevant to the recommended options are discussed in the Executive Summary (Table 2).

The U.S. textile industry will not be able to adequately raise prices to offset wastewater control expenditures. Due to the proportion of the industry that will be required to make control expenditures, the strong competitive threat from foreign textile producers, and the existing domestic intra-industry competition. The projected financial impacts assume the portion of the industry affected by control compliance requirements will absorb all the associated wastewater treatment costs.

The impact analysis suggests some textile facilities may not choose to continue operations after the imposition of control requirements. Plant closures and resulting losses in employment in small communities are not expected to seriously disrupt the industry as a whole. The lost production capacity could be absorbed by existing plants, and their effects on the national balance of payments would be negligible.

Table 1. Summary of Impacts: Investment requirements, operating and maintenance costs, and annualized costs

	Total number of plants	Number of plants incurring costs 1/	Total investment requirements	Total operating and maintenance costs	Total annualized cost
			-------------------	($1,000)	-------------------
Direct Dischargers (BAT)					
Wool scouring	6	5	652	259	396
Wool finishing	8	8	6,912	2,272	3,733
Woven fabric finishing			33,380	8,370	15,430
Simple processing	35	23	6,829	1,941	3,386
Complex processing	14	14	8,479	2,057	3,848
Desizing	36	29	18,072	4,372	8,196
Knit fabric finishing			12,487	3,490	6,131
Simple processing	24	22	8,537	2,211	4,021
Complex processing	15	12	3,259	948	1,634
Hosiery products	7	7	691	331	476
Carpet finishing	11	6	1,491	443	756
Stock & yarn finishing	36	32	8,972	2,522	4,418
Nonwoven manufacturing	5	5	799	280	448
Felted fabric processing	1	1	308	95	161
SUBTOTAL	198	164	65,001	17,731	31,473
Indirect Dischargers (PSES)					
Wool scouring	10	7	2,198	1,023	1,473
Wool finishing	26	18	8,408	3,120	4,852
Woven fabric finishing			22,564	8,693	13,384
Simple processing	156	0	-	-	-
Complex processing	56	19	11,286	4,346	6,688
Desizing	31	16	11,278	4,347	6,696
Knit fabric finishing			13,210	5,157	7,847
Simple processing	185	0	-	-	-
Complex processing	47	0	-	-	-
Hosiery products	153	51	13,210	5,157	7,847
Carpet finishing	45	0	-	-	-
Stock & yarn finishing	178	30	11,278	4,190	6,513
Nonwoven manufacturing	26	0	-	-	-
Felted fabric processing	15	0	-	-	-
SUBTOTAL	928	141	57,658	22,183	34,069
TOTAL (BAT & PSES)	1,126	305	122,663	39,914	65,542

1/ Number of plants incurring costs include those plants which were not meeting the effluent guidelines in the base year (1979) and will be required to install controls.

Table 2. Summary of Impacts: Economic and financial 1/

Type discharger/subcategory	Number of plants incurring costs	Required price increases	Cash flow Base case	 After controls	Net present value Base case	 After controls	Potential plant closures	Employment loss	Capacity loss
		(%)	($1,000,000)				(mil lb)		
Direct Dischargers (BAT)									
Wool scouring	5	0.4-1.0	-0.1- 1.4	-0.2- 1.3	-1.1- 1.2	.117	3	564	56.2
Wool finishing	8	-0.3-0.7	1.7-19.2	1.3-18.3	0.5-39.6	-0.9-36.3	2	860	6.6
Wool fabric finishing	66	0.1-1.0	0.2-50.0	0.1-49.6	-0.1-52.8	-0.4-51.1	1	38	2.4
Simple processing	23	0.1-1.0	0.2-16.3	0.1-16.1	-0.1-20.7	-0.4-16.1	1	38	2.4
Complex processing	14	0.1-0.7	1.0-50.0	0.9-49.6	0.7-52.8	0.1-51.1	-	-	-
Desizing	29	0.1-0.8	0.9-26.0	0.8-25.5	0.7-28.5	0.1-26.8	-	-	-
Knit fabric finishing	41	0.0-1.2	0.2-53.2	0.1-52.7	0.1-59.0	-0.2-57.3	1	124	1.1
Simple processing	22	0.0-0.6	0.6-53.2	0.4-52.7	0.8-59.0	0.3-57.3	-	-	-
Complex processing	12	0.1-1.2	0.5-10.9	0.4-10.7	0.7-10.2	0.3- 9.4	-	-	-
Hosiery products	7	0.2-0.3	0.2- 2.0	0.1- 1.9	0.1- 1.5	-0.2- 1.3	1	124	1.1
Carpet finishing	6	0.1-0.2	3.1- 9.3	2.9- 9.0	6.0-21.3	5.5-20.4	-	-	-
Stock & yarn finishing	32	0.1-1.3	0.4-11.7	0.2-11.5	-0.2-16.4	-0.6-15.6	2	207	8.6
Nonwoven manufacturing	5	0.1-0.3	1.2- 3.1	2.3- 6.1	1.9- 5.6	1.1- 3.0	-	-	-
Felted fabric processing	1	1.0-1.1	1.0- 1.2	0.9- 1.0	1.2- 2.3	0.6- 1.7	-	-	-
SUBTOTAL	164						9	1,793	74.9
Indirect Dischargers (PSES)									
Wool scouring	7	1.0-3.9	0.2- 1.3	-0.2-0.9	-0.4- 0.3	-17- 0.6	7	1,102	100.4
Wool finishing	18	0.2-1.0	0.9-19.2	0.6-18.2	0.7-39.6	0.2-36,7	6	1,170	8.4
Woven fabric finishing	35	0.1-1.5	0.4-38.0	0.1-36.8	0.5-36.2	-0.6-32.0	7	1,055	50.7
Simple processing	-	NA	NA	NA	NA	NA	-	-	-
Complex processing	19	0.1-1.5	0.4-25.4	0.2-24.6	0.5-26.7	-0.5-23.8	4	539	22.5
Desizing	16	0.1-1.2	0.9-38.0	0.5-36.8	0.7-36.2	-0.6-32.9	3	516	28.2
Knit fabric finishing	51	0.2-0.8	0.4-4.4	0.2-4.1	0.4- 9.7	-0.3- 8.8	18	5,529	21.3
Simple processing	-	NA	NA	NA	NA	NA	-	-	-
Complex processing	-	NA	NA	NA	NA	NA	-	-	-
Hosiery products	51	0.2-0.8	0.4-4.4	0.2-4.1	0.4- 9.7	-0.3- 8.8	18	5,529	21.3
Carpet finishing	-	NA	NA	NA	NA	NA	-	-	-
Stock & yarn finishing	30	0.3-5.2	0.1-8.3	-0.3-7.8	-0.2-16.6	-0.8-14.7	14	847	31.8
Nonwoven manufacturing	-	NA	NA	NA	NA	NA	-	-	-
Felted fabric processing	-	NA	NA	NA	NA	NA	-	-	-
SUBTOTAL	141						52	9,703	212.6
TOTAL (BAT & PSES)	305						61	11,496	287.5

1/ Ranges shown for the parameters reflect the high and low values for all models in a subcategory.

BAT. Approximately 200 plants in the industry are direct dischargers and subject to BAT. A total of 164 of these are expected to incur the BAT control costs. Required price increases range from a low of less than 0.5 percent for one of the large simple knit fabric models to a high of 1.3 percent for one of the small stock and yarn models. The probability of price pass-through is generally low for all subcategories. The largest range of cash flow occurs in the knit fabric subcategories with flows ranging between $0.2 million and $53.2 million. Under controls this range is reduced to $0.1 million and $52.7 million. The only negative cash flows occur for models in the wool scouring subcategory. The cash flows for the small wool scouring model are negative both under baseline and under BAT controls. Negative NPV's under baseline occur in three subcategories for smaller models: wool scouring, woven fabric finishing and stock & yarn finishing. Under BAT controls, models in two additional subcategories show negative NPV'S: wool finishing and knit fabric finishing. A total of 9 closures are projected under the costs of BAT control. These closures are expected to result in reductions in employment of about 2,000 workers and loss in capacity of close to 75 million pounds.

PSES. There are an estimated 928 indirect discharger plants subject to PSES controls; however, only 141 are expected to be required to incur costs. In the woven fabric subcategory, less than 20 percent of the plants are expected to incur costs while, in knit fabric, only the hosiery plants will require controls. Generally, higher price increases are required for the indirect discharger models as compared to the direct models, primarily because of the smaller plants in the indirect discharge category. The highest increase required is shown for the stock and yarn subcategory at 5.2 percent.

As is the case for direct dischargers, the probability for price pass-through for indirect dischargers is low for all subcategories. All subcategories show positive cash flows under baseline while two subcategories show negative flows under PSES controls: wool scouring and knit fabric (hosiery products). With the imposition of PSES controls, negative NPV's are shown for models in wool scouring, wool finishing, woven fabric, knit fabric (hosiery products) and stock and yarn finishing. A total of 52 plants are projected to close under PSES. These closures are expected to account for a reduction in employment of about 10,000 workers and a loss of capacity of over 200 million pounds.

BAT/PSES. Under both BAT and PSES, a total of 61 plants are projected to close with a resultant loss in employment of over 11,000 workers and reduction in capacity of 287.5 million pounds.

BCT. An estimated total of about 10 waterjet weavers are subject to BCT effluent limitations. BPT is the recommended option for these plants under the effluent limitations. Of the 10 weavers, only 3 have not met BPT and are expected to incur costs. Investment requirements for these weavers are about $1.1 million while the annual costs amount to slightly over $0.5 million. None of these jet weavers is projected to close under the costs of control.

NSPS/PSNS. The feasibility of new source model plants and their viability under pollution control are shown in Table 3 for both direct (NSPS) and indirect (PSNS) dischargers. Models are considered viable under baseline in all of the subcategories except stock and yarn finishing, nonwoven and felted fabric. Models in these subcategories show negative net present values under baseline as well as under pollution control. Under the recommended options for both NSPS and PSNS, one of the desizing models in woven fabric finishing (own fabric) becomes marginal in addition to models in the above 3 categories.

RCRA. Only about 15 percent of the wet processors in the industry are expected to be required to incur RCRA costs. Total investment requirements, including initial and capital costs, amount to just over $2 million. The impacts of RCRA costs on the individual models were minor. These costs are not expected to result in any plant closures.

Table 3. Summary of Impacts: New Source

	Required price increase	Cash flow		Net present value (NPV)		Viability 1/	
		Base case	After controls	Base case	After controls	Base case	After controls
	(%)	----------	($million)	----------	----------		
Direct Discharger (NSPS)	1.3	13.0	11.0	18.7	15.0	V	V
Wool finishing							
Woven fabric finishing							
Simple processing	0.4-2.1	4.0-18.6	3.4-18.0	2.8-12.0	0.7-9.9	V	V
Complex processing	0.5-1.8	17.7-57.4	16.2-55.9	7.2-20.8	1.5-15.0	V	V
Desizing	0.6-2.1	11.5-30.0	10.6-29.1	0.3-18.3	-3.5-14.5	V	M-V
Knit fabric finishing							
Simple processing	0.5-3.2	6.3-23.6	5.5-22.8	8.2-35.3	5.2-32.3	V	V
Complex processing	0.5-2.6	4.1-14.2	3.5-13.6	3.8-16.7	1.7-14.6	V	V
Hosiery products	0.6	4.9	4.6	11.4	10.3	V	V
Carpet finishing	0.3	15.8	15.4	27.2	25.8	V	V
Stock & yarn finishing	1.1-8.9	1.2-5.9	0.6-5.3	-1.0-6.8	-3.1-4.6	M-V	C-V
Nonwoven manufacturing	0.5	6.2	5.8	8.2	6.7	V	V
Felted fabric processing	1.3	4.3	3.9	-7.1	-8.5	C	C
Indirect Dischargers (PSNS)							
Wool fabric finishing	0.3	22.5	22.0	25.6	23.5	V	V
Woven fabric finsihing							
Simple processing	0.4-2.4	1.8-9.4	1.6-9.1	2.9-5.6	2.0-4.7	V	V
Complex processing	0.3-1.9	3.3-16.6	3.0-16.2	1.4-9.1	0.2-8.0	V	M-V
Desizing	0.2-0.8	12.7-30.6	12.2-30.1	5.1-22.5	3.4-20.8	V	V
Knit fabric finishing							
Simple processing	0.3-1.8	3.6-22.5	2.4-21.3	3.6-22.5	2.4-21.3	V	V
Complex processing	0.3-1.9	3.6-14.3	3.3-14.0	3.8-10.5	2.7-9.4	V	V
Hosiery products	0.2-0.3	9.9-12.5	9.7-12.3	22.3-22.6	21.4-21.8	V	V
Carpet finishing	0.4	10.8	10.5	13.1	11.9	V	V
Stock & yarn finishing	1.0-4.4	1.2-2.9	1.0-2.7	-1.0-3.1	-1.8-2.2	M-V	C-V
Nonwoven manufacturing	0.2	23.3	23.0	-5.9	-7.0	M	M
Felted fabric processing	0.9	4.3	4.1	-7.1	-7.9	C	C

1/ V = viable, M = marginal, C = closure.

I. INTRODUCTION

The Environmental Protection Agency is charged with the responsibility to restore and maintain the chemical, physical and biological integrity of the nation's water. This authority is granted under the Clean Water Act (the Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977).

The Act required that all industries discharging into navigable water achieve the "best practicable control technology" (BPT) by July 1, 1977. Now attention is focused on achieving the next major milestone specified by the Act by July 1, 1984. At that time the Act required the application of effluent treatment technology based upon the very best control and treatment measures. These effluent limitations require:

For Direct Dischargers

- Application of the "Best Available Technology Economically Achievable" (BAT) for toxic and nonconventional pollution.
- Application of the "Best Conventional Pollutant Control Technology" (BCT) for conventional pollutants.
- "New Source Performance Standards" (NSPS) are also being established for new industrial dischargers.

For Indirect Dischargers

- Achievement within 3 years of promulgation of pretreatment standards for existing sources (PSES).
- Achievement upon commencement of operations, of pretreatment standards for new sources (PSNS).

A. Scope of this Report

This report analyzes the economic impact of the imposition of water pollution controls on the Textile Mills Point Source Category. Prepared under the supervision and review of the Office of Analysis and Evaluation, U.S. Environmental Protection Agency, the study considers the economic effects of the wastewater controls. The analysis addresses impacts at both the micro and macro economic levels. To accomplish such analysis, the total industry, as well as individual firms within the industry, are represented in this analysis.

B. Organization of this Report

This report includes a total of ten chapters. Chapter II discusses, in detail, the methodology used in estimating the economic impacts of the various effluent limitation guidelines and respective control options. In general, model plants were developed to represent the various sizes and types of plants found in the industry. A net present value analysis is then employed to determine the economic and financial impacts of the regulatory alternatives.

Chapter III, IV, and V deal with various aspects of the industry background such as the structure of the industry including the number, sizes and types of plants and employment characteristics. A financial profile of the industry and a discussion of prices and price determination are also included. Chapter VI describes the representative model plants and how they are related to the total industry.

The treatment alternatives are discussed in Chapter VII along with the investment and operating cost for each alternative. Various alternatives are developed for each size and type of plant. The economic impacts are described in Chapter VIII. All alternatives considered for each regulation, BAT, BCT, etc. are discussed, then, summarized for the recommended options. The analysis is concluded with a discussion of impacts on "small" versus "large" firms as required by the Regulatory Flexibility Act.

This report summarizes the textile industry's structure, financial characteristics, marketing and pricing practices, and representative model plants. Control costs, which were adapted to the model plant approach, were provided in the Development Document. The specific types of economic impacts that are examined in this report include:

1) Prices
2) Profitability
3) Industry Growth
4) Capital Availability
5) Number of Plants
6) Production
7) Employment
8) Communities
9) Balance of Trade

C. Data Sources

Data utilized in the preparation of this report were obtained from both primary and secondary sources. Primary sources were those associated with the industry itself and included plants, mills and textile associations. Secondary sources were publications prepared by the government, industry, and private institutions. Some of the more relevant data and data sources are discussed below and are reflected in the bibliography at Appendix A.

1. Primary Data Sources

Information acquired directly from mills or from representatives of the industry were considered primary data. The major sources of primary data in this study included an industry survey, mill visits by DPRA personnel, and informal discussions with industry representatives.

The initial industry survey was concluded in 1977 under the authority of Section 308 of the Clean Water Act and used in the development of the economic analysis for proposed standards and published in October 1979 [1] [2]. A follow-up survey was accomplished as a part of the work to develop this report and used to update the model plants to 1979 conditions. This included an additional 173 questionnaires with a response rate of 55 percent. Also the follow-up survey enabled a more complete data base to be assembled. A copy of the data collection portfolio is presented in Appendix C.

Visits to textile mill operations allowed the authors to gain an important insight into the operational and managerial characteristics of these plants. These visits were coordinated through various industry trade organizations and the facilities selected are believed to be fairly representative of a cross-section of the industry. The information obtained during these visits supplemented data received from the surveys.

2. Secondary Data Sources

The published data utilized in this analysis were predominately obtained from various reports available from both private and governmental sources. These secondary data sources are utilized throughout this analysis to depict historical industry trends and to supplement and verify information received from primary sources. This latter use of secondary information was particularly important in the development of the financial model plants to assure the representativeness and accuracy of the models. A complete listing of the major secondary sources utilized in the development of this report are listed in the Bibliography.

1/ EPA "Economic Impact Analysis of Proposed Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Textile Mills Point Source Category. Prepared by DPRA under Contract No. 68-01-4632, October 1979.

2/ Complete details of the industry survey are contained in the 1979 economic report covering the proposed guidelines.

II. METHODOLOGY

The methodological approach utilized to assess the likely economic impact of effluent control limitations on the textile industry is summarized in this chapter. In this impact study, economic impact is defined as the differences between (1) the projections of the likely effects on a plant, a local area, the United States, and on foreign activity which would result from an industry's compliance with a given level of effluent control standards and (2) the projection of industrial activity and changes which would likely occur in the absence of control standards (baseline conditions).

In particular, the principal economic variables of interest in this study are:

(1) price effects--including effects upon industry's suppliers and consumers,
(2) profitability--growth and capital availability,
(3) number, size, and location of plants that can be expected to close or curtail employment,
(4) changes in employment,
(5) community impacts,
(6) dislocation effects,
(7) balance of trade consequences,
(8) other impacts.

In the case of best available technology economically achievable (BATEA) and pretreatment standards for existing sources (PSES), the analysis focused on price increases, plant closings, curtailments of production, dislocations of production, unemployment, community impacts, and balance of trade effects. For new source performance standards (NSPS) and pretreatment standards for new sources (PSNS), the impacts were assessed in terms of the effects on industry growth, prices, plant locations (i.e., domestic or foreign production), and balance of trade. The specific bases for effluent control relating to the textile industry are described in detail in a separate EPA report. 1/

1/ Development Document for Proposed Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Textile Mills Point Source Category, U.S. Environmental Protection Agency, Effluent Guidelines Division, to be published.

Several interrelated analyses were used to evaluate likely economic impacts resulting from effluent control requirements on the textile industry. These in-depth analyses included: (1) a characterization and subcategorization of the technical and economic structure of the industry, (2) a description of the financial profile of the industry, (3) the construction of representative model plants, (4) an evaluation of pricing patterns within the industry, (5) a description of the technological options for meeting designated levels of pollution control and the costs associated with each option, and (6) the analysis of economic impacts.

The overall analysis, however, was not a simple sequential one; rather, it employed interacting feedback steps. The schematic of the analytical approach is shown in Exhibit II-1. Due to the fundamental causal relationships among the financial and production effects and other impacts, a greater emphasis was devoted to plant closure analysis.

A. Industry Structure and Subcategorization

The industry structure and subcategorization analysis primarily involved describing and segmenting the industry in terms of its past and current economic characteristics in order to provide an information base for the subsequent analytic steps. In particular, the information on industry characteristics was useful in determining an appropriate disaggregation design for industry subcategorization.

The subcategorization involved segmenting the plants within the industry into relatively homogenous classes with respect to plant size, regional differences, technology employed, number of products, existing level of pollution, scale of technological processes, level of output, or other relevant factors important for assessing the impact of pollution controls. This delineation of industry subcategories served as the basis for the definition and construction of representative model plants and the determination of the wastewater treatment technological options and costs appropriate to each.

B. Financial Profile of the Industry

The ability of firms within the industry to finance investment for pollution control was determined, in part, by the past and expected financial conditions of those firms. Under the heading "financial profile of the industry," various factors were studied to develop insight into the financial characteristics of actual plants in the industry. Much of the data compiled in this section was also useful in determining the financial profiles of representative model plants.

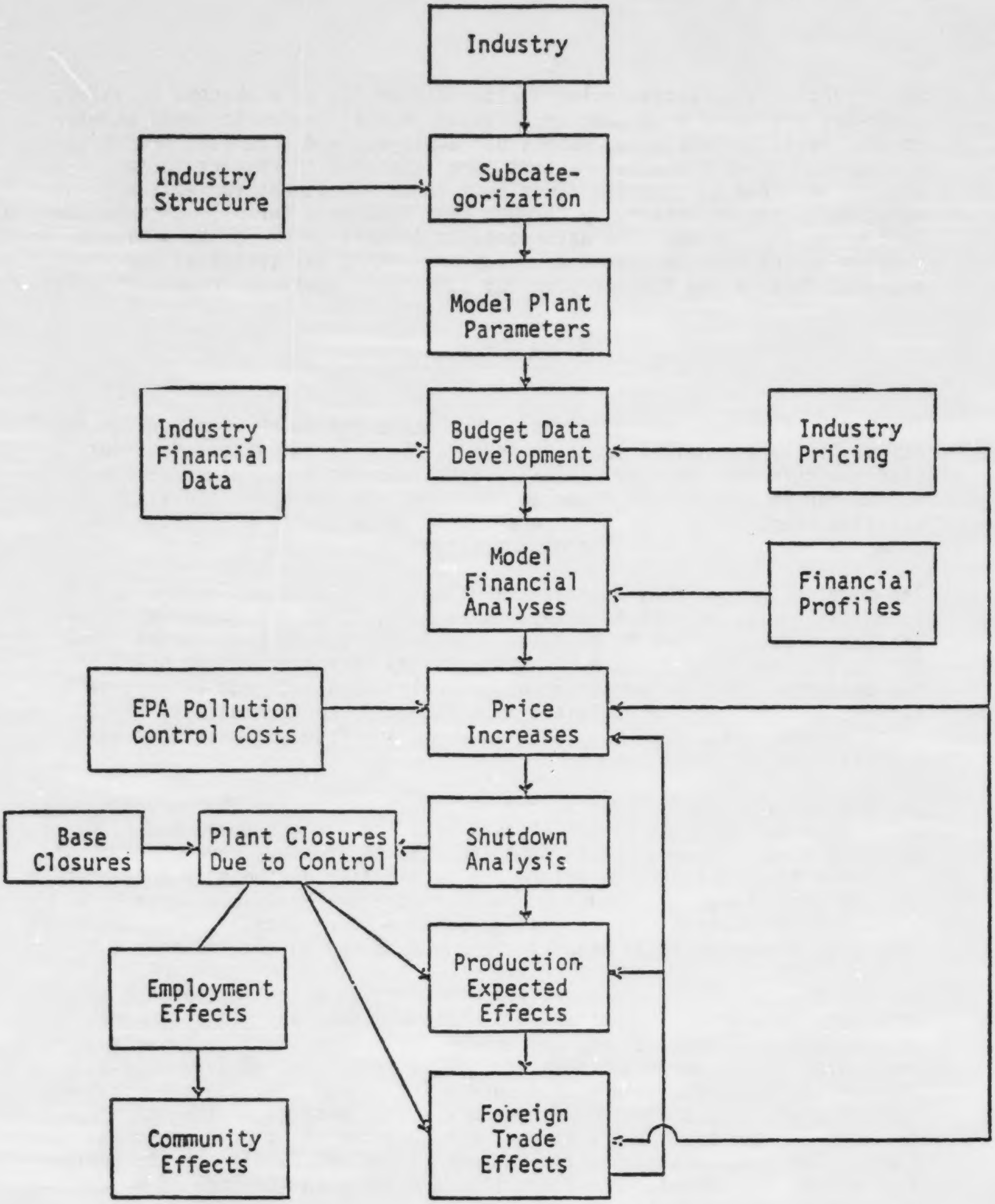
Industry
Industry Structure
Subcategorization
Model Plant Parameters
Industry Financial Data
Budget Data Development
Industry Pricing
Model Financial Analyses
Financial Profiles
EPA Pollution Control Costs
Price Increases
Base Closures
Plant Closures Due to Control
Shutdown Analysis
Employment Effects
Production Expected Effects
Community Effects
Foreign Trade Effects

Exhibit II-1. Schematic of economic impact analysis of effluent control guidelines

Key financial statistics included after-tax profit as a percent of sales, after-tax profit as a percent of invested capital, sales to total assets ratios, sales per employee, assets per employee, and after-tax profit to net worth. Other financial factors were studied with respect to the ability of firms to generate funds to finance investment for effluent management, either internally through cash flow or externally through new debt or equity issues. The data compiled in this phase of the analysis provide an information base useful for projecting key technical and economic factors and for carrying out subsequent economic impact analysis.

C. Model Plants

The model plant analysis used was a systematic framework within which to assess likely economic impacts on individual types and sizes of actual plants within the industry. Usually more than one model plant was required for an industry in order to represent various types and sizes of existing plants or plants which are likely to be constructed after the promulgation of effluent control guidelines.

The model plant profiles represent a variety of financial, economic, and technical variables such as sales, investment, fixed and variable costs, profits, size, and type of process. The profiles were constructed from information and data gathered in the industry characterization phase of the analysis. This information was generally obtained from an industry survey, plant visits, discussions with industry representatives, trade publications, other secondary data sources, and from engineering cost-synthesis methods.

In developing the model plants, the best data source was the industry surveys which provided detailed financial data from the various types and sizes of existing firms. However, data from the industry surveys were checked with published financial data to assure the reliability of the data contained in the surveys. Also, data from published sources are available annually which allow historical trends to be considered as well as enabling the industry's financial situation to be updated without resurveying the industry.

Thus, the model plants are developed utilizing an eclectic approach which considers data from both primary and secondary sources. In a typical development of a model plant, key economic/financial data (e.g. sales, production costs, margins, asset structure) are collected from numerous sources and converted to a common base. These data are, in turn, analyzed and compared, considering also nonquantifiable aspects of the industry, to determine the appropriate parameter to use for the particular model plant. The consolidation of the various parameters results in the depiction of the key economic and financial components in the form of a representative model plant.

The applicability of utilizing model plant data for assessing expected economic impacts of pollution controls rests principally on the representativeness of the selected model plant(s). For example, the economic concept of "economies-of-scale" in production is often present in processing plants, e.g., average unit costs of production are usually lower for large plants than for medium or small plants of the same type. Furthermore, there are expected economies-of-scale in waste treatment, which, in effect, will compound the economies-of-scale relationships among differing sizes of plants.

In general, economies-of-scale relationships in pollution control costs have been demonstrated, and this alone would necessitate multiple model plant analyses to evaluate differential economic effects. Other processing factors, e.g., type of manufacturing process employed (technology) may also affect processing costs and wasteflows. This again may necessitate a further segmentation of an industry and the inclusion of additional model plants for a more comprehensive analysis.

D. Pricing Patterns

The analysis of pricing patterns in the textile industry focused on factors determining supply and demand. Market structure and the nature of competition were evaluated, a step which, for the textile industry, involved the inclusion of the influence that international markets and competition assert on the domestic industry's prices. Finally, the ability of plants to recover the increased costs of pollution controls was assessed.

E. Waste Treatment Technological Options and Costs

Waste treatment options and their associated costs are obviously instrumental in the assessment of the economic impacts of water pollution controls. In general, basic technical and cost data were developed specifically for various types and sizes of model plants using the appropriate discharge method (direct or indirect). This analysis also examined model plants reflecting new facilities which were projected most likely to be built after the promulgation of the guidelines. In determining appropriate options and costs, it was necessary to specify 1) the points of final disposition of discharge in each industry segment, and 2) the types and proportions of effluent systems in place. This information was primarily obtained from EPA, Effluent Guidelines Division through the technical contractor.

Cost data from the technical contractor usually included estimated investment costs for various treatment options for each model plant and their respective estimated annual operating and maintenance costs based upon normal operating rates or annual production capacity.

F. Other Regulatory Costs

In addition to regulations pertaining to water pollution control, plants are also subject to other federal regulatory requirements which depend upon the industry and the nature of its processes and/or products. These regulations can pertain to product quality, air pollution, solid waste disposal, occupational safety and other areas.

Unfortunately these other regulations are not uniformly required or enforced. Also, data reflecting the costs of compliance to these regulations are not often available. To the extent possible, the impact analysis considered the costs associated with these other regulations.

G. Analysis of Economic Impacts

This study's economic impact analysis required the establishment of a basecase of industry conditions that would prevail without pollution controls. The consequent economic impact of pollution controls was estimated by showing the changes from this basecase. Thus, in this study a "dynamic basecase"--a projection of the industry structure in terms of the number of its plants, production, employment and other parameters over time--was used as opposed to a "static" basecase descriptive of current industry conditions.

Fundamentally, the impact analysis was similar to that usually required for any capital budgeting study of new investments in which the problem is one of deciding whether a commitment of time or money to a project is worthwhile in terms of the expected benefits. The analysis was complicated by the fact that benefits and investments will accrue over a period of time and that, in practice, the analyst cannot reflect all of the required imponderables which, by definition, must deal with future projections. In the face of imperfect and incomplete information and of time constraints, the industry segments were described in the form of financial budgets of model plants. Key non-quantifiable factors were considered in the interpretation of the quantified data. Actual financial results deviated from the model results; however, these variances were considered in interpreting the findings based on model plants.

The analysis of anticipated economic impacts of water pollution controls are described as follows.

1. Fundamental Core Methodology

The fundamentals for analysis are basic to all impact studies. The core methodology is described here as a unit with the specific impact analyses discussed under the appropriate headings following this section.

a. Model Plant Impact Analysis

The core analysis for this study was based upon synthesizing the physical and financial characteristics of the various industry segments through representative model plant projections. Estimated financial profiles and cash flows are presented in the model plant chapter. The primary factors involved in assessing the financial and production impact of pollution control were profitability changes--a function of the cost of pollution control and a plant's ability to pass along these costs in the form of higher prices. In reality, closure decisions are seldom made on a set of well-defined and documented economic rules. They include a wide range of personal values, external forces such as the inability to obtain financing, or the relationship between a dependent production unit and its larger cost center whose total costs must be considered.

Such circumstances include but are not limited to the following factors:

(1) Inadequate accounting systems or procedures. This is especially likely to occur in small, independent plants which do not have effective cost accounting systems.

(2) Inefficient production units. This is particularly true of plants where the equipment is old and fully depreciated, and the owner has no intention of replacing or modernizing it. Production continues as long as labor and materials costs are covered until the equipment fails entirely.

(3) Personal values and goals associated with business ownership that override or constrain rational economic rules. This complex of factors may be referred to as the value of psychic income.

(4) Production dependence. This is characteristic of a plant that is a part of a larger integrated entity which either uses raw materials being produced profitably in another of the firm's operating units or supplies raw materials to another of the firm's operations where the source of supply is critical. When the profitability of the second operation more than offsets the losses in the first plant, the unprofitable operation may continue indefinitely because the total enterprise is profitable.

(5) Temporary unprofitability. This may be found whenever an owner-operator expects that losses are temporary and that adverse conditions will change. His ability to absorb short-term losses depends upon his access to funds through credit or personal resources not presently utilized.

(6) Low (approaching zero) opportunity costs for the fixed assets and for the owner-operator's managerial skills labor. As long as the operator can meet labor and materials costs, he will continue to operate. He may even operate with gross revenues below variable costs until he has exhausted his working capital and credit.

(7) Plant-site appreciation. This factor is important in those situations where the value of the land on which the plant is located is appreciating at a rate sufficient to offset short-term losses.

These factors are generally associated with proprietorships and closely held enterprises rather than with publicly held corporations.

Although the above factors are present in and relevant to business decisions, they are not always susceptible to quantifiable analysis. This study's analytical techniques are sufficient, however, to provide useful and reliable insight into such potential business responses to required investment and operating costs for pollution control facilities. Accordingly this analysis of the model plants' impacts was primarily based on the determination of the model plants' net present values (NPV) both before and after expenditures for controls. This NPV analysis was then combined with considerations for unique influencing factors (such as those listed above) so that its assessment of impacts reflects, as accurately as possible, the responses actual businesses will make.

The computation of the net present values in such an analysis involves the discounting of the models' cash flows over some period of time (in this analysis 21 years) through the discounting function:

$$NPV = \sum_{n=1}^{t} A_n (1+K)^{-n} - I_o$$

where:

NPV = net present value
A_n = the cash flow in the n^{th} year
K = discount rate (after-tax cost of capital)
n = number of the conversion period, i.e., year 1, year 2, etc.
t = total number of conversion periods (years)
I_o = value of facility for nonconforming uses (salvage value for existing facilities and initial investment for new source facilities)

The resulting net present value indicates the excess of the present value of projected cash flows for an operating facility over the present value of what the equity holders could earn if they liquidated in year zero and invested the resulting money plus any additional investments they would normally be expected to invest to maintain the facility in operation during the time period (in this case twenty-one years) at the firm's estimated cost of capital. Thus, if the NPV is positive, the equity holders are earning a return which is greater than the model's cost of capital. If the NPV is negative, then the equity holders are earning less than the cost of capital, and in such a situation, they would be better off liquidating, realizing the salvage value in cash,[1] and reinvesting it at least at the firm's (industry) cost of capital.

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[1] Salvage value is defined here as the liquidation value of fixed assets plus working capital, i.e. sold for nonconforming uses.

Model plant NPV's are determined both without and with expenditures for pollution controls. Comparison of the base case (without controls) and the impacted case (with controls) allows the net effects of the controls to be determined. These effects in combination with other relevant economic considerations enable overall impacts to be determined.

b. Construction of the Model Plant Cash Flow and Capital Outlays

The cash flow and capital outlays used in this analysis of pollution control costs were constructed in the following manner:

(1) The cash flows were presented in current dollars thus requiring the use of different cash flows for each of the respective years.

(2) For existing model plants, the initial investment, taken in year t_0, was considered to be outlays for the model fixed assets (salvage value) and working capital.

(3) The after-tax cash proceeds were taken for years t_1 to t_n. These were adjusted annually for inflation.

(4) Annual reinvestment for replacement of depreciated assets was estimated for year t_1 and was adjusted annually to compensate for inflation and the net between reinvestment and depreciation.

(5) Terminal value of the model was taken in year t_n and reflected the salvageable assets plus the net working capital.

(6) Capital outlays for pollution controls, when applicable, were added to the models' total assets in increments during years t_1 to t_6.

(7) Annual pollution control expenses were incurred incrementally between years t_1 and t_6 reflecting the stages of construction completion for the capital outlays. After year t_6, expenses were adjusted annually for inflation.

(8) Depreciation of depreciable assets was computed utilizing rapid depreciation techniques for tax computations and the straight-line method for the pro forma income statements. Replacement investments of pollution control equipment began in year t_{11}.

(9) No terminal values of the pollution facilities were computed as it was anticipated there would be few, if any, salvageable assets in year t_n.

Base case cash flows consisted of Steps 1 through 5 and excluded investment and annual costs associated with pollution controls. Impacted cash flows consisted of Steps 1 through 9 and reflected the model plant after the imposition of environmental requirements.

In the construction of the cash flow for the net present value analysis, after-tax cash proceeds were defined as:

(1) After-tax income = $(1 - T) \times (R - E - I - D)$

(2) After-tax cash proceeds = $(1 - T) \times (R - E - D) + D$

where

T = tax rate
R = revenues
E = expenses other than depreciation and interest
I = interest expenses
D = depreciation charges

Depreciation was included only in terms of its tax effect and was then added back to obtain after-tax cash proceeds.

There is a temptation to include outlays for interest payments when computing the cash proceeds of a period. Cash disbursed for interest should not affect the cash proceeds computation. The interest factor is taken into consideration by the use of the present-value procedure. To also include the cash disbursement would result in double counting. The effect of interest payments on income taxes is also excluded from the cash proceeds computation. This was brought into the analysis when computing the effective rate of interest of debt sources of capital, which is used in the determination of the cost of capital.

A tax rate of 20 percent on the first $25,000 income, 22 percent on the second $25,000 income, and 48 percent on amounts over $50,000 was used throughout the analysis. Investment credits and carryforward and carryback provisions were not used due to their complexity and special limitations. The annual inflation rate used for this analysis was 6.0 percent. This rate reflects, approximately, the annual rate for the past ten years based on the historical implicit price deflators for the gross national product. A period of twenty-one (21) years was selected for the length of time to discount models' cash flows because this period of time was determined to be representative of the useful economic life of actual industry facilities. The important consideration in this length of time is the length of service of machinery and equipment. Building life for a facility typically is considerably longer than 21 years. However, building costs are small relative to the costs of production equipment. Furthermore, the 21 year period is sufficiently long enough to allow for business cycles and fluctuations to balance out.

While profitability is an important input to the net present value analysis, the overall assessment of a model plant's viability was not totally dependent upon the plant's level of profits. The NPV concept also considers the value of the model's equity to the equity holders as well as effects of the timing of the cash flows including consideration for depreciation schedules. A more common measure of profitability is return on investment (ROI) where after-tax income (as defined in Equation 1) is expressed as a percent of invested capital (book value) or as a percent of net worth. Such measures should not be viewed as necessarily different estimates of profitability when compared to the net present value concept; rather, these should be considered as entirely different profitability concepts. It should be noted the data requirements for ROI and NPV measures are derived from the same basic financial information, although the final inputs are handled differently for each.

c. Cost of Capital - After-tax

Return on invested capital is a fundamental notion in U.S. business. It provides both a measure of the actual performance of a firm as well as its expected performance. In the latter case, it is also called the cost of capital, and this, in turn, is defined as the weighted average of the cost of each type of capital employed by the firm--in general terms--equities and interest-bearing liabilities. Although no methodology yields the precise cost of capital, it can be approximated within reasonable bounds.

Equity capital. The cost of equity capital was estimated by two methods--the dividend yield method and the earnings stock price (E/P ratio) method. Both are simplifications of the more complex discounted cash flow (DCF) methodology. The dividend yield method is:

$$c = \frac{D_1}{P_o} + g$$

where:

c = cost of equity capital
D_1 = dividend per share expected at end of period 1
P_o = stock price at time o
g = growth of dividend per share

The earnings/price ratio method is:

$$c = \frac{E}{P}$$

where:

c = cost of equity capital
E = current earnings per share
P = current stock price

This latter method assumes that future earnings per share will be the same as the current earnings and that the dividend-payout ratio is 100 percent.

Debt Capital. The after-tax cost of debt capital was estimated by using an estimated cost of debt (interest rate) and multiplying it by 0.52 -- assuming a 48 percent tax rate.

$$d = .52\ i$$

where:

d = after-tax cost of debt capital
i = before-tax cost of debt (interest rate)

Weighted Cost of Capital. The sum of the cost of equity and debt capital weighted by the respective equity to equity plus debt and total debt to equity plus debt (where debt is long-term debt) ratios yields the estimated average cost of capital (k), after tax. This is depicted below.

$$k = \frac{\text{Equity}}{\text{Debt plus equity}} \times c + \frac{\text{Total debt}}{\text{Debt plus equity}} \times d$$

d. Investment Determination

In evaluating the feasibility of new plants, investment was thought of as outlays for fixed assets and working capital; however, in evaluating closure of an on-going plant, the investment basis was its salvage value (opportunity cost or shadow price).1/ For this analysis, salvage value was taken as the sum of liquidation value of fixed assets plus working capital (current assets less current liabilities) tied up by the plant. This same amount was taken as a negative investment or "cash out" value in the terminal year.

The rationale for using total shadow priced investment was that the cash proceeds do not include interest expenses which are reflected in the weighted cost of capital. This procedure required the use of total capital (salvage value) regardless of source. An alternative would have been to use as investment, net cash realization upon liquidation of the plant (total cash realized from liquidation less debt retirement). In the single plant firm, debt retirement would be clearly defined. In the case of the multiplant firm, the delineation of the debt by the plant would likely not be clear. Presumably this could be reflected in proportioning total debt to the individual plant on some plant parameter (i.e., capacity or sales). Under this latter procedure, interest and debt retirement costs would be included in the cash flows.

1/ This should not be confused with a simple buy-sell situation which merely involves a transfer of ownership from one firm to another. In this instance, the opportunity cost (shadow price) of the investment may take on a different value.

The two procedures will yield similar results if the costs of capital and the interest charges are estimated on a similar basis. The former procedure total salvage value was used as it gives reasonable answers and simplified both the computation and explanation of the cash proceeds and salvage values.

Replacement investment was considered to be equal to 100 percent times the annual depreciation. This corresponds to the operating policies of some managements and serves as a good proxy for replacement in an ongoing business.

Investments in pollution control facilities were determined from estimates provided by EPA. Only incremental values were used in order to reflect in-place facilities.

2. Price, Supply and Demand Impact Analyses

Price and supply and demand impact analyses necessarily have to proceed simultaneously. In order to evaluate these impacts, two types of analyses were used: one--the micro level--utilized the model plant as the basis of the analysis to arrive at required price impacts to maintain profitability levels; the other--the industry level--utilized supply and demand analysis.

Application of the preceding NPV procedure to these costs yielded the present value of pollution control costs (i.e., investment plus operating cost less tax savings). When this was known, the price increase required to pay for pollution control could readily be approximated by the formula:1/

$$X = \frac{(PVP)}{(1-T)} \frac{(100)}{(PVR)}$$

where:

X = required percentage increase in price
PVP = present value of pollution control costs
PVR = present value of gross revenue starting in the year pollution control is imposed
T = average tax rate

The required price increase at the plant level was evaluated in light of the price elasticities of the commodity involved and the competitive structure of the industry. This represented the second approach using supply and demand analysis. The supply and demand analysis provided some insights into likely quantities and supply responses to different prices. This allowed a preliminary estimate of the production and price impacts of pollution control costs. Following this, further analysis at the micro level was

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1/ The above procedure is conceptually correct where an average tax rate is used. However, to insure accuracy in the machine program where the actual tax brackets were incorporated, a more detailed iterative process was required.

performed to obtain a more detailed insight into the plants' responses to expected price changes, cost absorption, or plant closure (the plant closure criteria are discussed in Section G-4, below). The indicated plant shutdowns were then aggregated to test whether or not the lost production could be absorbed by the remaining capacity or whether such curtailments would increase prices.

3. Financial Impact Analysis

The financial impact analysis involved the preparation of pro forma income statements and cash flow statements (including computations of the models' net present values) following the assessment of the likely price change. The analysis provided estimates of profitability with and without pollution control costs and also provided information relative to the ability of the industry to finance this investment and estimated financial requirements. The ability to finance plant investment for pollution control could have a definite bearing on judgments and estimates with regard to likely plant closures.

4. Plant Closures and Production Effects

Plant closures may result from the inability of less profitable plants to adequately recover required pollution abatement cost through increased product prices, decreased input prices, or improvements in economic efficiency. Often closures can be anticipated among older, smaller and less efficient plants as a result of economies of scale in pollution control which would lower the overall costs to competing larger operations. Since the larger plants, whose unit pollution control costs are usually much less, will be able to afford to sell at a lower price than the smaller high-cost plants, the high-cost plants will have no recourse other than to sell at the long run equilibrium price set by the low-cost plants. Consequently, the older, smaller, less efficient plants would probably and eventually yield to the dominance of the larger,more efficient units. However, in the short run, a plant may continue to operate even when economic considerations indicate closure, especially when the smaller, high cost plants are protected by regional markets and other non-price impediments to competition from the larger low cost plants.

Most firms would cease operations if they could not adequately absorb the required wastewater control expenditures. The most obvious measurement of a firm's ability to absorb the costs is its ability to maintain a positive income or cash flow after incurring control expenditures. If incomes are negative, some firms would remain in operation as long as they cover variable costs (positive cash flows); however, the requirements for overhead expenses would eventually cause such firms to cease.

The remaining situation that could arise would be one in which firms maintain positive incomes and generate net present values (NPV of their cash flows at their cost of capital) which are positive. This indicates that these firms are earning a return on their operation which exceeds their cost of capital. If their NPV's are negative then the firms would liquidate, realize salvage value in cash, and reinvest in a more financially viable investment (one which would earn at least their cost of capital).

A review of the potential financial effects of the imposition of wastewater controls on the models results in some confusion in the determination of which plants would be forced to close due to an inability to absorb the control expenditures; a confusion which can result from a large number of models and wastewater control treatment alternatives applicable to each model. Accordingly, for this analysis, formalized closure criteria were developed. In the development of these criteria, certain necessary assumptions were made to simplify the interpretation of the impact results.

The closure criteria utilized are depicted below. These criteria basically represent the models' abilities to continue operations after incurring expenditures for wastewater controls.

Model's Viability	Net Present Value	Annual Cash Flow
Viable	Positive	Positive
Marginal	Slightly Negative 1/	Slightly Negative 1/
Closure	Negative	Negative

Based on the above criteria, closure decisions are made for each model at each treatment level. The number of existing facilities associated with the representative models which will cease operations due to wastewater control expenditure requirements are projected utilizing the following methodology.

(1) Based on the NPV closure criteria described previously, the subcategories and associated models projected to close are identified.

(2) Once identified, the following factors are considered in the determination of the number of actual existing plant closures associated with each projected model plant closure.

  (a) The number of existing facilities associated with the model.

  (b) The degree to which existing facilities already have at least some of the treatment controls in-place.

  (c) Historical trends for existing facilities within the subcategory as well as projections of the subcategory's future expectations (helps establish the base case).

  (d) The severity by which the model's financial data are reduced. Are the financial data substantially reflective of closure or are the data reflective of a borderline situation?

1/ The criterion utilized here was that the positive cash flow must be greater than the amount by which the NPV was negative or a positive NPV must be greater than the amount by which the cash flow was negative. If not, then the plant was projected to close.

(e) Review of data utilized (both published and survey data) to develop models. This allows the determination of the probable distribution of the financial profiles of existing facilities when compared to the financial profile of the closing model plant.

(f) Consideration of the reliability of the data utilized in the development of the model plants.

(3) Based on the above, the number of existing facilities projected to close are made. These projections are determined qualitatively, based on the analyst's knowledge of business and economic principles as well as the analyst's knowledge of the industry.

The determination of the production effects resulting from the plant closures is made by applying the projected number of existing facility closures to production quantities associated with the applicable model plant. This is then viewed from the perspective of whether or not the remaining facilities have the capability to absorb the lost production and if not, whether the lost production will be absorbed by increased foreign impacts or whether it will not be absorbed at all.

5. Employment Impact Analysis

This analysis was concerned with estimating likely employment losses due to curtailed production or plant closures as a result of pollution controls. If the actual plants which are expected to curtail production or to close could be identified, their employment impacts could be estimated directly. When, however, they cannot be identified, the employment impact analysis must involve the application of estimates of employment changes by model plants. Employment changes in model plants would then be generalized according to the number of actual plants represented by the model plant and aggregated to derive an estimate of total employment effects for the industry. Employment dislocations are noted, as appropriate.

6. Community Impact Analysis

The community impact analysis identified the potential impacts on local community economies when the impacted plant represented a major source of employment and income. This analysis was based on a knowledge of the location of plants, particularly threatened plants, and a general understanding of the economic base of those communities and the relative importance of threatened plants to local economies.

7. Dislocation Analysis

The analysis of the dislocational effects of control requirements addressed the possibility of plants closing their existing facilities to move to other locations offering better opportunities either for control compliance or production or market efficiencies. The potential for dislocation was particularly true for plants required to install control technologies which were land intensive where the plants were limited in their respective availability of land. This analysis was based on a general knowledge of trends in the industry, the availability of land for the industry's plants, and the land requirements of the treatment technologies.

8. Balance of Trade Impact Analysis

Balance of trade impact analysis dealt with those products that have competitive import and export positions. The analysis considered whether or not the estimated price changes would hinder the products competitive positions with regard to exports or increases in foreign imports. Where important, estimates on the amount of trade that potentially could be impacted and total trade levels are presented.

9. Other Impact Analysis

Other potential impacts may be created by the imposition of pollution control guidelines. These are unique to given industries and require a case-by-case approach. An illustration of such an impact would be a plant that produces a critical intermediate, an input for other industries. The loss of this plant or large price increases could produce serious backward or forward effects on producers or consumers. To the extent additional impacts were as important, they are noted.

III. THE STRUCTURE OF THE INDUSTRY

The textile industry is comprised of a diverse group of establishments varying in size, process, and product. The general characteristics of the industry establishments range from small family-owned mills utilizing traditional manufacturing and managerial practices to large multi-mill corporations relying on advanced managerial practices and sophisticated technologies. The final products produced by textile establishments range from twine, sandpaper, and tire cords to carpets, blankets, lace, hosiery, and apparel fabrics.

The characterization of the textile industry structure is difficult because of the diversity of establishments and the varying levels of integration. The most common structural depiction of the industry is the Standard Industrial Classification (SIC) system utilized by the U. S. Department of Commerce. This classification system, which groups establishments according to similar end products, is useful in that much of the published data concerning the industry are presented according to SIC classifications. However, the SIC groupings are often relatively large and thus represent a variety of types of establishments within a specific SIC grouping.

Another approach to the structural characterization of the industry is to categorize establishments according to the manufacturing functions performed at the facility. This functional approach is considerably more applicable to the industry and, because wastewater characteristics are predominately dependent upon the process functions performed at a facility, it enables the industry establishments to be grouped into categories with similar wastewater characteristics.

The disadvantage of the functional categorization of the industry is that there is very limited published data corresponding to the specific functional categories. Accordingly, both categorization approaches are utilized in this chapter to describe the industry structure. When possible, attempts will be made to relate the two approaches so the industry structure is adequately represented.

A. Subcategorization of the Industry

The textile industry consists of establishments which typically create and/or process textile related materials for further processing into apparel, home furnishings, or industrial goods. While the SIC groupings are primarily based on the final product shipped from the establishments, actual industry facilities are more realistically classified according to the functions performed at each establishment.

The following material in this section discusses the subcategorization of the textile industry using two taxonomies: (1) SIC industry groups, and (2) categorization of plants by manufacturing process.

1. Conventional Industry Subcategories

According to the Department of Commerce, the United States textile/apparel industry is characterized as being comprised of two distinct industry groups with one group manufacturing textile products such as fabric and carpets and the other group manufacturing apparel. The Census, through the SIC system, categorizes these two industry groups as the Textile Mill Products Group (SIC 22) and the Apparel and Other Textile Products Group (SIC 23), respectively.

The Textile Mill Products Group, or the textile industry, includes 30 separate industries which manufacture approximately 90 classes of products. These establishments are principally engaged in receiving and preparing fibers; transforming these materials into yarn, thread, or webbing; converting the yarn and web into fabric or related products; and finishing these materials at various stages of production. Many of these establishments produce final consumer products such as thread, yarn, bolt fabric, hosiery, towels, sheets, carpets, etc., while the rest produce transitional products for use by other establishments in both SIC Groups 22 and 23.

The Apparel and Other Textile Products Group, or the apparel industry, includes 33 separate industries which manufacture some 70 classes of products. The establishments in this group are principally engaged in receiving woven or knitted fabric for cutting, sewing, and packaging for consumer purchase.

The processes associated with the textile industry are numerous and some result in the generation of wastewaters. The processes associated with the apparel industry are generally considered dry and do not result in the generation of wastewater. Consequently, the facilities in the apparel industry (SIC 23) do not have, nor do they require, wastewater discharge regulations. Accordingly, an economic impact evaluation of SIC 23 will not be necessary and thus this group has been eliminated from further discussion in this report.

Under the SIC system, the textile industry includes establishments engaged in performing any of the following operations: (a) preparing fiber and subsequent manufacturing of yarn; (b) manufacturing broad woven fabric, narrow woven fabric, knit fabric, and carpets and rugs from yarn; (c) dyeing and finishing fiber, yarn, fabric, and knit apparel; (d) coating and waterproofing fabric; (e) the integrated manufacturing of knit apparel; and (f) the manufacturing of felt goods, lace goods, nonwoven fabrics, and miscellaneous textiles.

The SIC system also divides the textile industry into nine 3-digit industry groups and thirty 4-digit SIC industries. At the 3-digit level the overall industry includes four groups of Weaving Mills (SIC 221-224) with a single

4-digit SIC industry classified under each of the groups. Also at the 3-digit group level are the Knitting Mills (SIC 225), Textile Finishing (SIC 226), Floor Covering Mills (SIC 227), Yarn and Thread Mills (SIC 228), and Miscellaneous Textile Goods (SIC 229).

The major characteristics of the 3-digit groups are described below:

1. Weaving Mills (SIC 221, 222, 223, 224). This classification covers establishments constructing fabric by interlacing yarns of wool, cotton or man-made fibers. These materials can be woven into broad woven (greater than 12 inches) or narrow (12 inches or less) fabrics.
2. Knitting Mills (SIC 225). This classification contains establishments constructing fabric by connecting yarns of cotton, wool or man-made fibers. Knit production is more flexible and faster than weaving and accordingly knitting machinery allows for rapid pattern changes. The SIC system subclassifies knitting mills into groups including hosiery, knit apparel and knit fabrics.
3. Textile Finishing--Except Wool (SIC 226). This classification consists of establishments involved in the dyeing and treating of cotton and man-made fabrics and yarn. Fabrics are dyed by different methods, depending on the desired effect, and can be treated to resist wrinkles and static, inhibit flames, repel water, or provide any number of other qualities.
4. Floor Covering Mills (SIC 227). This classification encompasses mills producing a variety of carpets and rugs including woven and tufted.
5. Yarn and Thread Mills (SIC 228). This classification includes eatablishments spinning yarn from fibers of cotton or wool or producing yarns from man-made fibers.
6. Miscellaneous Textile Goods (SIC 229). This classification covers establishments utilizing a variety of processes to produce numerous products such as non-woven fabric, felt, lace goods, padding and upholstery filling, tire cords and cordage, and twine.

Table III-1 lists the respective 4-digit industries corresponding to the above 3-digit industry groups and describes their primary operations.

Selected 4-digit industries can be further classified according to their respective type of organization. The industries, which are predominately associated with finishing operations, can be classified as one of the following: 1) manufacturer; 2) commission mill; or 3) contractor. Typically the manufacturer processes fabrics and apparel utilizing their own raw materials while the commission and contractor firms process fabrics owned by others. The selected 4-digit industries and their respective types of organizations are depicted in Table III-2. It should be noted that while the organizational distinction is not particularly important from a technological point-of-view, it is economically significant as the financial profiles of the various organizations would differ.

Table III-1. Textile mills products (Standard Industrial Classification)

Group No.	Industry No.	Industry title	Description of primary operations
221		BROAD WOVEN FABRIC MILLS, COTTON	
	2211	Broad Woven Fabric Mills, Cotton	Weaving fabrics over 12 inches in width, wholly or chiefly by weight of cotton.
222		BROAD WOVEN FABRIC MILLS, MAN-MADE FIBER AND SILK	
	2221	Broad Woven Fabric Mills, Man-Made Fiber and Silk	Weaving fabrics over 12 inches in width, wholly or chiefly by weight of silk and man-made fibers including glass.
223		BROAD WOVEN FABRIC MILLS, WOOL (INCLUDING DYEING AND FINISHING)	
	2231	Broad Woven Fabric Mills, Wool (Including Dyeing and Finishing)	Weaving fabrics over 12 inches in width, wholly or chiefly by weight of wool, mohair, or similar animal fibers; dyeing and finishing all woven wool fabrics or dyeing wool, top or yarn.
224		NARROW FABRICS AND OTHER SMALLWARES MILLS: COTTON, WOOL, SILK, AND MAN-MADE FIBER	
	2241	Narrow Fabrics and Other Smallware Mills: Cotton, Wool, Silk, and Man-Made Fiber	Weaving or braiding fabrics, 12 inches or narrower in width of cotton, wool, silk, and man-made fibers, including glass fibers; producing fabric covered elastic yarn or thread.
225		KNITTING MILLS	
	2251	Women's Full Length and Knee Length Hosiery	Knitting, dyeing or finishing womens' and misses' full length and knee length hosiery, both seamless and full-fashioned, and panty hose.
	2252	Hosiery, Except Women's Full Length and Knee Length Hosiery	Knitting, dyeing, or finishing hosiery other than those produced in SIC industry 2251.
	2253	Knit Outerwear Mills	Knitting outerwear from yarn, or manufacturing outerwear from knit fabric produced in the same establishment.
	2254	Knit Underwear Mills	Knitting underwear and nightwear from yarn, or manufacturing underwear and night wear from knit fabric produced in the same establishment.
	2257	Circular Knit Fabric	Knitting circular (tubular) fabric, or dyeing or finishing this type fabric.
	2258	Warp Knit Fabric Mills	Knitting, dyeing, or finishing warp (flat) knit fabric.
	2259	Knitting Mills, Not Elsewhere Classified	Knitting gloves and other articles, not elsewhere classified.
226		DYEING AND FINISHING TEXTILES, EXCEPT WOOL FABRICS AND KNIT GOODS	
	2261	Finishers of Broad Woven Fabrics of Cotton	Finishing purchased cotton broad woven fabrics, or finishing such fabrics on a commission basis. Operations include bleaching, dyeing, printing, and other mechanical finishing.
	2262	Finishers of Broad Woven Fabrics of Man-Made Fiber and Silk	Finishing purchased man-made fiber and silk broad woven fabrics or finishing such fabrics on a commission basis. Operations include bleaching, dyeing, printing, and other mechanical finishing.
	2269	Finisher of Textiles, Not Elsewhere Classified	Dyeing and finishing textiles, not elsewhere classified, such as bleaching, dyeing, printing and finishing of raw stock, yarn, braided goods, and narrow fabrics, except wool and knit fabrics.

Continued--

Table III-1. (continued)

Group No.	Industry No.	Industry title	Description of primary operations
227		FLOOR COVERING MILLS	
	2271	Woven Carpets and Rugs	Weaving and finishing carpets and rugs from any textile yarn.
	2272	Tufted Carpets and Rugs	Tufting and finishing carpets and rugs from any textile fiber.
	2279	Carpets and Rugs, Not Elsewhere Classified	Manufacturing rugs, carpets, and squares, floor mattings, needle punch carpeting, and door mats and matting from twisted paper, grasses, reeds, coir, sisal, jute.
228		YARN AND THREAD MILLS	
	2281	Yarn Spinning Mills: Cotton, Man-Made Fibers and Silk	Spinning yarn wholly or chiefly by weight of cotton, man-made fibers, or silk.
	2282	Yarn Texturizing, Throwing, Twisting, and Winding Mills: Cotton, Man-Made Fibers and Silk	Texturizing, throwing, twisting, winding, or spooling yarn wholly or chiefly by weight of cotton, man-made fibers or silk
	2283	Yarn Mills, Wool, Including Carpet and Rug Yarn	Spinning, twisting, winding or spooling yarn (including carpet and rug yarn) and thread wholly or chiefly by weight of wool, mohair, or similar animal fibers.
	2284	Thread Mills	Manufacturing thread from natural or man-made fiber except flax and wool.
229		MISCELLANEOUS TEXTILE GOODS	
	2291	Felt Goods, Except Woven Felts and Hats	Manufacturing pressed felt.
	2292	Lace goods	Manufacturing lace machine products.
	2293	Paddings and Upholstery Filling	Manufacturing batting, padding, wadding, and filling for upholstery, quilted pillows, and apparel.
	2294	Processed Wastes and Recovered Fibers and Flock	Processing textile mill waste for spinning, or other uses.
	2295	Coated Fabrics, Not Rubberized	Manufacturing coated and impregnated textiles.
	2296	Tire Cord and Fabrics	Manufacturing cord and fabric for use in reinforcing rubber tires, industrial belting, fuel cells, and similar uses.
	2297	Nonwoven Fabrics	Manufacturing nonwoven fabrics by mechanical, chemical, thermal or solvent means or by a combination of these means.
	2 98	Cordage and Twine	Manufacturing rope, cable, cordage, twine, and related products from fiber.
	2299	Textile Goods, Not Elsewhere Classified	Manufacturing textile goods, not elsewhere classified, processing textile fibers to prepare them for spinning, such as wool scouring and combing.

Source: U.S. Department of Commerce, Office of Federal Statistical Policy and Standards, Standard Industrial Classification Manual, 1972.

Table III-2. Type of organizations in the textile industry

SIC no.	SIC Industry	SIC suffix	Type of Organization
2231	Weaving and finishing, wool	11	manufacturers
		51	jobbers, commission weaving
2253	Knit outerwear mills	11	manufacturers
		22	converters
		33	contractors
2257	Circular knit fabric mills	11	manufacturers
		22	converters
		33	contractors
2258	Warp knit fabric mills	11	manufacturers
		22	converters
		33	contractors
2261	Finishing plants, cotton	11	finishing own fabrics
		51	commission finishing
2262	Finishing plants, man-made	11	finishing own fabrics
		51	commission finishing
2269	Finishing plants, NEC	11	finishing own yarn
		51	commission finishing
2282	Throwing and winding mills	11	manufacturers
		51	commission mills

Source: U.S. Department of Commerce, Bureau of the Census

2. Subcategorization of Mills by Type of Process

While the SIC system categorizes establishments according to their end product, it has been determined within most SIC groups, substantial differences in wastewater characteristics occur. The reason for these differences is that while the general end products of different establishments are similar, the methods of producing the end products may differ. An example of this would be a fully integrated facility producing a finished textile product being in the same SIC grouping as an establishment which contracted or commissioned another firm to do the majority of the processing but yet which retained title to the finished product and was responsible for shipping the final product. Therefore, the SIC system is not an effective means of segmentation of the industry with respect to manufacturing processes and waste characteristics.

Because of its structure, combinations of end products, types of fiber consumed and manufacturing and finishing processes, the textile industry required considerable study to develop well defined groupings with similar waste characteristics. Factors that had to be considered were raw materials used, products, manufacturing processes, sizes and ages of mills and equipment, waste control technology, treatment costs, energy requirements, and solid waste generation and disposal requirements. A number of approaches have been used in the past in addition to the SIC system; however most had serious drawbacks regarding subcategorization.

Categorization in some of the more recent studies on textile waste water characteristics and treatment have been based on raw materials, further identified by product lines and associated effluents. One of the most extensive studies is contained in the 1974 Development Document on Textile Mills Point Source Category. It categorized first on the basis of a very important raw material distinction, the processing of wool versus other textile fibers (primarily cotton and synthetics). It then categorized wool and other textile fibers based on products that relate by types of wastes. Using this approach, the subcategories discussed below were developed for the purpose of segmenting the industry by establishments having discharge characteristics while maintaining a logical and manageable system.

The nine subcategories and a brief description of the type of facilities which would be classified in each subcategory are presented below.

Subcategory

(1) Wool Scouring. This subcategory covers facilities primarily engaged in scouring natural impurities from raw wool and other animal fibers. Integrated mills that perform wool scouring and other finishing operations fall within Subcategory 2 (discussed below). Wool scouring is separated from other subcategories because wool and

other animal fibers require extensive preliminary cleaning resulting in raw wastes considerably stronger than those of other subcategories.

(2) Wool Finishing. This subcategory covers facilities that finish fabric, a majority of which is wool, other animal fiber, or blends containing primarily wool or other animal fibers, by employing any of the following processing operations on at least five percent of their total production: carbonizing, fulling, bleaching, scouring (not including raw wool scouring), dyeing and application of functional finish chemicals. Mills that primarily finish stock or yarn of wool, other animal fibers, or blends containing primarily wool or other animal fibers and that perform carbonizing are included in this subcategory; those wool stock or yarn mills that do not perform carbonizing and scouring are covered under Subcategory 7, Stock and Yarn Finishing. The processes comprising a typical wool finishing operation include carbonizing, fulling, fabric scouring, and dyeing. Wool finishing is differentiated from other finishing categories because of the manufacturing processes (principally carbonizing and fulling) and dyes and other chemicals associated with wool operations. As a result, wool finishing operations generate high volume wastes with pH fluctuations and oil and grease.

(3) Low Water Use Processing. Low water use processing operations include establishments primarily engaged in manufacturing greige goods, laminating or coating fabrics, texturizing yarn, tufting and carpet backing, producing tire cord fabric, and similar activities in which either cleanup is the primary water use or process water requirements are small, or both. These operations were excluded from analysis since the process-related wastewater generated and discharged from each facility is comparatively small.

(4) Woven Fabric Finishing. This subcategory covers facilities that primarily finish fabric, a majority of which is woven, by employing any of the following processing operations on at least five percent of their production: desizing, scouring, bleaching, mercerizing, dyeing, printing, or application of functional finish chemicals. Integrated mills that finish a majority of woven fabric along with greige manufacturing or other finishing operations such as yarn dyeing are included in this subcategory and total finishing production should be applied to the applicable Woven Fabric Finishing effluent limitations to calculate discharge allowances. Denim finishing mills are also included in this category. Woven fabric composed primarily of wool is covered under Subcategory 2 - Wool Finishing.

A wide variety of processes are used in finishing woven fabric, and, in terms of cumulative flow this subcategory is the largest. Processes that may be employed include desizing, scouring, bleaching, mercerizing, dyeing, printing, and application of functional finish chemicals.

Desizing results in a major difference in waste characteristics of woven fabric finishing facilities, and the amount of desizing practiced is responsible for differences in the waste characteristics within the Woven Fabric Finishing subcategory as well. In addition, the number of processes performed at a particular mill may vary from merely scouring or bleaching to all of those previously listed. Consequently, it is important to further subdivide this subcategory.

(a) Simple Processing. This Woven Fabric Finishing subdivision covers facilities that perform fiber preparation, desizing, scouring, functional finishing, and/or one of the following processes applied to more than five percent of total production: bleaching, dyeing, or printing. This subdivision includes all Woven Fabric Finishing mills that do not qualify under either the Complex Processing or Desizing subdivisions. (described below)

(b) Complex Processing. This Woven Fabric Finishing subdivision covers facilities that perform fiber preparation, desizing of less than 50 percent of their total production, scouring, mercerizing, functional finishing, and more than one of the following, each applied to more than five percent of total production: bleaching, dyeing, and printing.

(c) Complex Processing Plus Desizing. This Woven Fabric Finishing subdivision covers facilities that perform fiber preparation, desizing of greater than 50 percent of their total production, scouring, mercerizing, functional finishing, and more than one of the following, each applied to more than five percent of total production: bleaching, dyeing, and printing.

(5) Knit Fabric Finishing. This subcategory covers facilities that primarily finish fabric made of cotton and/or man-made fibers, a majority of which is knit, by employing any of the following processing operations on at least five percent of their production: scouring, bleaching, dyeing, printing, and application of lubricants, antistatic agents, and functional finish chemicals. Integrated mills that finish a majority of knit fabric along with greige manufacturing or other finishing operations such as yarn dyeing are included in this subcategory.

Basic knit fabric finishing operations are similar to those in the Woven Fabric Finishing subcategory and may include scouring, bleaching, dyeing, printing, application of lubricants, antistatic agents, and functional finish chemicals. Knitting is performed in conjunction with finishing at most of these facilities. Desizing is not required in knit fabric finishing and mercerizing is uncommon in practice. The generally lower waste loads of the subcategory can be attributed to the absence of these processes.

As with woven fabric finishing, the number of processes performed at a mill may vary considerably. In addition, hosiery manufacture is distinct in terms of manufacturing and raw wastewater characteristics. Consequently, internal subdivision is required for this subcategory.

(a) Simple Processing. This Knit Fabric Finishing subdivision covers facilities that perform fiber preparation, scouring, functional finishing, and/or one of the following processes applied to more than five percent of total production: bleaching, dyeing, or printing. This subdivision includes all Knit Fabric Finishing mills that do not qualify under either the Complex Processing or Hosiery subdivisions.

(b) Complex Processing. This Knit Fabric Finishing subdivision covers facilities that perform fiber preparation, scouring, functional finishing, and/or more than one of the following processes each applied to more than five percent of total production: bleaching, dyeing, or printing.

(c) Hosiery. This Knit Fabric Finishing subdivision covers facilities that are engaged primarily in dyeing or finishing hosiery of any type. Compared to other Knit Fabric Finishing facilities, Hosiery mills are generally much smaller (in terms of wet production), more frequently employ batch processing, and more often consist of only one major wet processing operation. All of these factors contribute to their lower water use and much smaller average wastewater discharge.

(6) Carpet Finishing. This subcategory covers facilities that primarily finish textile-based floor covering products, carpets and rugs, by employing any of the following processing operations on at least five percent of their production: scouring, bleaching, dyeing, printing, and application of functional finish chemicals.

Integrated mills that finish a majority of carpet along with tufting or backing operations or other finishing operations such as yarn dyeing are included in this subcategory. Mills that only perform carpet tufting and/or backing are covered under Subcategory 3 - Low Water Use Processing. Carpet finishing is a distinct segment of the textile industry because of the lower degree of processing required and the typically weaker wastes that result.

(7) Stock and Yarn Finishing. This subcategory covers facilities that primarily finish stock, yarn, or thread of cotton and/or man-made fibers by employing any of the following processing operations on at least five percent of their production: scouring, bleaching, mercerizing, dyeing, or application of functional finish chemicals. Thread processing includes bonding, heat setting, lubrication, and dressing, however these processes are basically dry and do not generate much wastewater. Facilities finishing stock, or yarn, principally of wool also are covered if they do not perform carbonizing as needed for coverage under Subcategory 2 - Wool Finishing. Denim finishing is included under Subcategory 4 - Woven Fabric Finishing.

Typical stock and yarn finishing may include scouring, bleaching, mercerizing, dyeing, or functional finishing. Stock dyeing is basically tub dyeing, but yarn or thread dyeing may include any of the following methods: skein, package, space, or beam. As a result of process differences, the concentrations of the pollutants in the raw wastewater in this subcategory are lower than those found in most other subcategories.

(8) Nonwoven Manufacturing. This subcategory covers facilities that primarily manufacture nonwoven textile products of wool, cotton, or man-made fibers, singly or as blends, by mechanical, thermal, and/or adhesive bonding procedures. Nonwoven products produced by fulling and felting processes are covered in Subcategory 9 - Felted Fabric Finishing.

The Nonwoven Manufacturing subcategory includes a variety of products and processing methods. The processing is dry (mechanical and thermal bonding) or low water use (adhesive bonding) with the major influence on process-related waste characteristics resulting from the cleanup of bonding mix tanks and application equipment. Typical processing operations include carding, web formation, wetting, bonding (padding or dipping with latex acrylic or polyvinyl acetate resins) and application of functional finish chemicals. Pigments for coloring the goods are usually added to the bonding materials.

(9) Felted Fabric Finishing. This subcategory covers facilities that primarily manufacture nonwoven products by employing fulling and felting operations as a means of achieving fiber bonding.

Wool, rayon, and blends of wool, rayon, and polyester are typically used to process felts. Felting is accomplished by subjecting the web or mat to moisture, chemicals (detergents), and mechanical action. Wastewater is generated during rinsing steps that are required to prevent rancidity and spoilage of the fibers.

The major relationships between the functional categories and the SIC system are shown in Table III-3. The table indicates those SIC industries in which each of the functions are being performed. Conversely it points out for each of the functional categories the SIC industries under which plants or mills may be classified.

For example, the Wool finishing subcategory includes mills classified under two SIC industries: SIC 2231 (woven wool fabric), and SIC 2283 (wool yarn).

Woven Fabric Finishing includes mills classified under five SIC industries; SIC 2211 (woven cotton), SIC 2221 (woven man-made), SIC 2241 (narrow fabrics), SIC 2261 (cotton fabric finishing), and SIC 2262 (man-made fabric finishing).

Except in the case of SIC 2261, 2262, and 2269, the SIC industries will fall either in the "low water processing category" or one of the finishing subcategories. Mills classified under SIC 2269 will fall for the most part, in the Stock and Yarn Finishing subcategory. All of the mills classified under SIC 2261 or 2262, should fall within the single subcategory-Woven Fabric Finishing.

For purposes of the impact analysis, the textile industry will be segmented according to the functional classification system described in this section. This segmentation will serve as the basis for the development of representative economic model plants discussed in Chapter VI.

It should be noted for the remainder of the discussions of this report, an attempt will be made to portray information according to the functional categorization scheme. Unfortunately, however, much of the published data are not organized in this scheme but rather are based on the SIC system. As such, some report sections are necessarily depicted on a SIC basis.

B. Plant Characteristics

Characterization of establishments in the textile industry is somewhat difficult due to the diverse nature of textile mills. While many textile mills are still small, family owned operations utilizing older traditional manufacturing processes, there also exist numerous larger, multi-plant corporation owned operations who have the latest in textile manufacturing equipment. In this section the major characteristics of these diverse mills will be discussed.

Table III-3. Comparison of functional subcategories and SIC groups and industries

	SIC INDUSTRY GROUPS										
	(221-224) Weaving Mills		(225) Knitting Mills		(226) Textile Finishing		(227) Floor Covering Mills		(228) Yarn & Thread Mills		(229) Miscellaneous
Subcategory	cotton & man-made fibers	wool	warp & circular fabric	knit goods	cotton & man-made fiber fabrics	yarn & thread	woven	tufted	spinning & texturizing	wool	
	---SIC industries in which functions are being performed---										
1 Wool scouring											2299
2 Wool finishing		2231									
3 Low water use processing	(all industries, except textile finishing 2261, 2262, 2269)										
4 Woven fabric finishing	2211 2221 2241				2261 2262						
5 Knit fabric finishing			2257 2258	2253 2252 2259							
5c Hosiery products 1/				2251 2252							
6 Carpet finishing							2271	2272			
7 Stock & yarn finishing	2211 2221 2241	2231 2/				2269			2281 2282 2284	2283	
8 Nonwoven manufacturing											2297
9 Felted fabric processing											2291

1/ Hosiery products is a subdivision of the knit fabric finishing subcateory.

2/ Weaving mills (SIC 2211, 2221, 2241) which finish yarn prior to weaving and do not finish the woven fabric are classified in the stock and yarn finishing subcategory. Plants in SIC 2231 which finish wool yarn only on classified in the stock and yarn finishing subcategory.

Source: Development Planning and Research Associates, Inc. Compiled from information available in the Development Document and information available from the U.S. Department of Commerce, Bureau of the Census.

1. Ownership Characteristics

In the early 1900's, the textile industry was characterized by a large number of small, family-owned, highly specialized plants. About 1925, modernization began to bring about significant changes in the ownership characteristics with a trend towards concentration into larger, publicly owned corporations. By 1974, the 100 largest corporations in the industry accounted for over 60 percent of the industry's assets while the 20 largest accounted for about 45 percent, according to data contained in the Source Book of Statistics of Income (IRS). The concentration has resulted in the reduction of the number of small, privately-held firms; many of which have been acquired by larger firms. In 1969, over 30 percent of all of the textile companies were non-corporate enterprises, including 2,300 proprietorships and 800 partnerships. A year later, one-third of these had disappeared either as a result of acquisitions, closures, or incorporations. According to the Census less than 700 noncorporate firms were in operation in 1972. About 60 percent of these were single proprietorships and 40 percent were partnerships.

The types of operation and legal forms of organization for selected segments of the textile industry are shown in Table III-4 for 1972 (the latest year for which these data have been published). Of the 7,203 establishments in the industry, close to 6,500, or 90 percent, were organized as corporations, either as single plant or parts of multi-unit companies. The remaining 700 establishments were organized as noncorporate entities, predominantly as single unit companies. The greatest corporate concentration occurred within the yarn and thread segment with 96 percent of the establishments incorporated. The least concentration occurred within the carpet and rug industry with 82 percent organized as corporations.

According to the Census data the noncorporate establishments were generally smaller mills within the industry with close to 85 percent of the noncorporate firms operating with less than 20 employees per plant. Approximately 30 percent of the corporate firms were in this employee-size category. The small size of noncorporate companies is also apparent in a comparison of shipments; while the noncorporate firms accounted for about ten percent of the total mills in the country, they produced less than one percent of the industry's output.

The largest publicly held corporation presently is Burlington Industries with over one hundred plants in the U.S. and about 70,000 employees. The second largest is J. P. Stevens with close to 45,000 employees and an estimated 70 plants. The twenty largest publicly held corporations (as reported in The Value Line) are estimated to own close to 500 mills and plants. The largest privately held corporation is Deering Miliken with an estimated 50 plants, based on data contained in Davison's Blue Book.

Table III-4. Type of operation and legal form of organization for establishments in the textile industry (numbers of establishments), 1972

	Weaving		Finishing		Knitting		Carpets		Yarn		Total[1/]	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,293	100.0	655	100.0	2,723	100.0	529	100.0	807	100.0	7,203	100.0
Legal form												
Corporate	1,189	92.0	616	94.0	2,410	88.5	434	82.0	775	96.0	6,489	90.1
Noncorporate	104	8.0	39	6.0	313	11.5	95	18.0	32	4.0	714	9.9
Type of Operation												
Multi unit												
Corporate	642	49.6	234	35.7	669	24.6	157	29.7	425	52.7	2,463	34.2
Noncorporate	2	0.2	3	0.5	1	2/	3	0.6	3	0.4	16	0.2
Single unit												
Corporate	547	42.3	382	58.3	1,741	63.9	277	52.3	350	43.3	4,026	55.9
Noncorporate	102	7.9	36	5.5	312	11.5	92	17.4	29	3.6	698	9.7

Source: U.S. Department of Commerce, Bureau of the Census, Census of Manufactures.

1/ Includes establishments in Miscellaneous Textile Goods (SIC 229).

2/ Less than 0.05 percent.

Many of the largest publicly held companies are closely held, according to information contained in The Value Line. Close to 90 percent of the stock in the Barwick Corporation is owned by its directors and officers. Over 70 percent of Spring Mill's stock is owned by insiders. Between 40 and 50 percent of the stock is controlled by insiders in companies such as Belding Heminway, Cone Mills, Lowenstein and Sons, Martin Processing, and Reeves Bros. Over 40 percent of Fieldcrest Mills' stock is owned by the Amoskeag Company, a Dutch based organization.

Although most of the mills in the industry are owned by corporations primarily engaged in textile manufacturing, many are owned by other types of enterprises which have logical footholds in the textile industry. All of the largest tire manufactures have mills specializing in the fabrication of tire cord and fabrics (SIC 2296). Many of the chemical companies producing man-made fibers for the industry have extended their operations to include the manufacture of yarns and fabrics. About 30 percent of the sales of Owens-Corning Fiberglas are in textile products. Dupont not only produces man-made fiber but also is involved in the manufacture of fabrics and finishes. GAF, with revenues in chemicals and building material exceeding one billion dollars, manufactures felts. Armstrong-Cork which is one of the largest manufacturers of resilient flooring owns a mill manufacturing tufted carpets. Standard Oil (Indiana) has a textile subsidiary manufacturing synthetic fabrics as an extension of its chemical operation.

Recreation industries involved in the manufacture of sporting goods have often entered the textile and apparel area. Brunswick owns a subsidiary engaged in carpeting activities. Industries involved in the production of household and personal care items have also moved into textile activities. Colgate-Palmolive produces nonwoven fabrics including bandages, towels, and disposable diapers. Parke-Davis manufactures surgical materials in its textile operations.

Ownership characteristics are diverse and changing. Understanding of each segment's ownership characteristics is important as it may be a consideration in the determination of each segment's ability to generate capital necessary to meet the proposed effluent discharge limitations. This determination of ability to finance capital expenditures is discussed in detail in Chapter IV.

2. Single vs. Multiplant Operations

According to the Census Data, 34 percent of all of the plants (or mills) in the industry operate in multiplant companies (99 percent of these are incorporated). These plants account for about 77 percent of the industry shipments and employ over 80 percent of all textile workers. The parent companies vary in size from the large Burlington Industries (over 100 plants) to the relatively small 2 and 3 plant operations. The operating and financial characteristics of these "multiplant operations" (as used in this discussion, the term means a single plant which is part of a multiunit company) differ not only from the single plant operations but also among the other multiplant operations. The differences which are relevant to this study involve differences in sizes, type operations, and financial profiles.

The single plant operations are predominantly smaller than the multiplant. The Census of Manufactures estimates the number of small plants having less than 20 employees for each of the 4 digit SIC industries. From these estimates, approximately 2900 plants or 37 percent of the plants in the industry are identified as small. Over 90 percent of these small establishments are single plant operations. Table III-5 shows the percentage of small plants in the total industry and in selected SIC industries. In addition it compares the percentage of small plants in each of the two categories: single and multiplant operations. SIC industries with a relatively large number of small plants are wool finishing, circular knit, carpet tufting and cotton textile finishing, each with about 40 percent of the total plants classified as small. The percentages of small plants among the multiplant operations in these industries range from 8 percent in wool finishing and carpet tufting to 20 percent in textile finishing (cotton). In the single plant operations in each of these industries, the percentages of small plants exceeds 50 percent. The two SIC industries with the lowest percentages of small plants are the man-made weaving mills and the yarn mills each with less than 20 percent. The percentage of small plants in the multiplant operations of these industries are 3 and 4 percent, respectively. The percentages of small plants in the single plant operations are 43 percent for the weaving mills and 36 percent for the yarn mills. For the total textile industry, 8 percent of all multiplant operations are small as opposed to 52 percent of the single plant operations.

Table III-6 illustrates the relatively small size of the single plant operations from a different perspective. In the table, the average size in terms of value of shipments of the large plants in each of the two categories are compared. In this case the large plants are those with an employment level of 20 or more employees. The largest average sizes are found in weaving (SIC 2211 and 2221) and textile finishing (man-made fibers-SIC 2262) with shipments exceeding $13 million. In these SIC industries, the average size of the multiplant operations is approximately 3 times as great as that of the single plant operations. In the multiplant category, the smallest plants are found in wool weaving and finishing (SIC 2231), wool yarn mills (SIC 2283) and felt processing (SIC 2292) with shipments averaging between $5 and $6 million.

The smallest sizes in single plant operations are found in hosiery (SIC 2251), knit fabric (SIC 2257 and 2258) and wool yarn (SIC 2283). Shipments in these industries average less than $2 million. The average of all plants in the multiplant category is $10 million which is 4 times as great as the $2.3 million average for the single plant operations. The least differences between averages of the two categories occur in wool weaving and finishing, carpet tufting, yarn mills and felt processing.

In addition to being characterized by size, single plant operations can be characterized by type of plant within segments (types of plant include commission, finishers of own fabric, and integrated mills). Table III-7 shows the percentage of single plant operations in the various segments by types of plant; these percentages are based on the survey of the industry

Table III-5. Small plants in selected SIC industries -- (Plants with less than 20 employees)

SIC	SIC Industry	Total small plants as a percent of all plants	Small multiplants [1] as a percent of all multiplants	Small single plants as a percent of all single plants
2211	Weaving mills cotton	38	3	62
2221	Weaving mills man-made fibers	21	3	43
2231	Weaving and finishing mills wool	48	8	54
2251	Women's hosiery	30	2	44
2257	Circular knit fabric mills	43	9	54
2258	Warp knit fabric mills	35	7	37
2261	Finishing plants cotton	54	20	52
2262	Finishing plants man-made fibers	33	11	36
2269	Finishing plants (n.e.c.)	51	14	51
2272	Tufted carpets and rugs	44	8	55
2281	Yarn mills, except wool	19	4	36
2283	Wool yarn mills	42	10	48
2291	Felt	43	11	67

[1] Multiplants represent plants that are a part of multiplant companies.

Source: Census of Manufactures, 1972 and 1977.

Table III-6. Plant shipments of selected SIC industries
(Average shipments of plants with 20 or more employees)

SIC	SIC Industry	Multiplants	Single plants
		---------($1,000,000)	-----------
2211	Weaving mills cotton	13.5	4.2
2221	Weaving mills man-made fibers	13.9	3.0
2231	Weaving and finishing mills wool	5.5	2.2
2251	Women's hosiery	7.9	1.3
2257	Circular knit fabric mills	11.0	1.9
2258	Warp knit fabric mills	10.3	1.4
2261	Finishing plants cotton	8.9	2.2
2262	Finishing plants man-made fibers	13.4	4.3
2269	Finishing plants (n.e.c.)	7.2	2.1
2272	Tufted carpets and rugs	11.8	5.2
2281	Yarn mills, except wool	7.1	3.6
2283	Wool yarn mills	5.6	1.7
2291	Felt	5.2	3.7
SIC 22 Total	Textile Mill Products	10.0	2.3

Source: Census of Manufactures, 1972.

Table III-7. Single plant operations in segments by type plant (Plants responding to industry survey)

Type plant	Segment	Percent of plants in segment
commission	wool scouring	75
	wool finishing	100
	woven fabric finishing	70
	knit fabric finishing	100
	stock & yarn finishing	100
finishers, own textiles	woven fabric finishing	20
	hosiery finishing	60
	stock & yarn finishing	50
integrated mills	wool finishing	70
	woven fabric finishing	40
	knit fabric finishing	40
	hosiery finishing	60
	carpet finishing	35
	stock & yarn finishing	50

Source: Development Planning and Research Associates, Inc.

done as a part of this economic analysis. The largest portion of all commission mills are single plant operations. Based on the survey results, all of the commission mills found in three subcategories (wool finishing, knit fabric, and yarn finishing) were single plant operations. In wool scouring and woven fabric finishing about 70 percent of the commission mills were single plant operations. Among finishers of their own textiles, the percentage of single plant operations varied widely between the three subcategories involved. In woven fabric finishing, only 20 percent of the plants were found to be single plant operations. In hosiery and yarn finishing, the percentages of single plant operations varied from a low of 35 percent in carpet finishing to a high of 70 percent in wool finishing.

As can be expected from the difference in sizes and type plants, there are significant differences in the financial profiles of single and multiplant operations as reflected in Table III-8. The table compares value of shipments and cost of materials (both expressed as percentages of value shipments) and the inventory turnover ratios between the single and multiplant operations in selected SIC industries. With one exception, the value added (percent) of single plant operations of all industries is greater than that of multiplant operation while the cost of materials is less. This relationship indicates primarily the economies of scale which can be attributed to differences in sizes. The greatest differences in value added occur in the knit fabric mills (SIC 2257 and 2258) and the man-made textiles finishing plants (SIC 2262). Relatively minor differences occur in several of the SIC industries. In man-made weaving (SIC 2221) and textile finishing (SIC 2269) the difference in the value added amounts to only a percentage point between the two categories. The inventory turnover (the ratio of value of shipments to inventories) for single plant operations is generally higher than that of multiplants. This can be attributed to a combination of factors. Significant considerations are the specialized markets and products with which the single plant operations can be expected to be involved.

While the most significant differences in financial profiles stem from the size and type plant characteristics of each category, differences also result from the financial accounting systems inherent in the two categories. The economic viability of a single plant operation can be directly measured by its income statement and balance sheet. There is relatively no flexibility in accounting for increased costs associated with pollution control. Reduction in profits because of the imposition of controls will directly reflect a change in viability of the plant. However, the viability of the multiplant operations is tied in with the profitability of the parent company. The financial accounting is more flexible and the impacts of controls can not be as easily discerned. However, the degree of flexibility still depends to a great extent on the type organization of the parent company. Exhibit III-1 shows the basic corporate organizational structures found in the industry: (1) parent-subsidiary and (2) corporate headquarters - division.

Table III-8. Financial characteristics of single and multiplant operations--selected SIC industries

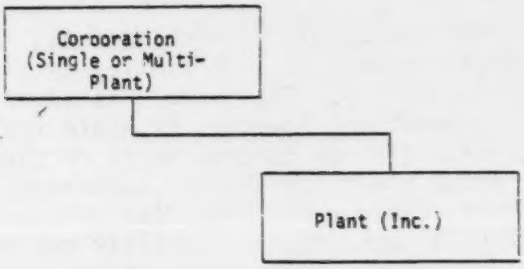
SIC	SIC Industry	Plant Operations	Value Added	Cost of Material	Inventory Turnover[1]
		----(as a % of shipments) ----			(ratio)
2211	Weaving mills cotton	Multi-	40	60	6.8
		Single	49	52	11.6
2221	Weaving mills man-made fibers	Multi-	47	53	6.8
		Single	53	47	7.5
2231	Weaving and finishing mills wool	Multi-	51	51	4.5
		Single	58	43	6.1
2251	Women's hosiery	Multi-	43	55	5.2
		Single	50	50	7.9
2257	Circular knit fabric mills	Multi-	35	67	7.8
		Single	46	54	11.3
2258	Warp knit fabric mills	Multi-	29	73	5.6
		Single	52	49	9.3
2261	Finishing plants cotton	Multi-	51	50	9.6
		Single	54	46	13.2
2262	Finishing plants man-made fibers	Multi-	33	67	9.2
		Single	60	40	21.9
2269	Finishing plants, (n.e.c.)	Multi-	42	58	12.9
		Single	43	57	15.1
2272	Tufted carpets and rugs	Multi-	31	70	5.4
		Single	42	62	6.5
2281	Yarn mills, except wool	Multi-	38	62	9.4
		Single	43	58	8.7
2283	Wool yarn mills	Multi-	41	63	5.6
		Single	45	56	7.4
2291	Felt	Multi-	56	44	5.3
		Single	51	49	8.9
Total	SIC 22 Textile Mills Products	Multi-	40	60	6.8
		Single	49	52	11.6

[1] Shipments divided by inventory
Source: Census of Manufactures, 1972.

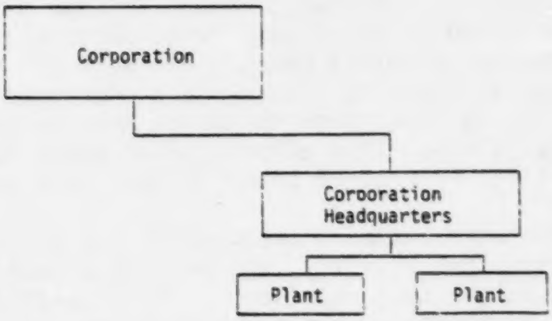
Exhibit III-1. Multiplant corporations.

PARENT-SUBSIDIARY

(Single plant subsidiary)

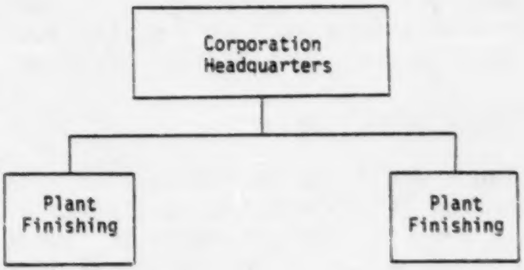

Corporation (Single or Multi-Plant)
Plant (Inc.)

(Multiplant subsidiary)

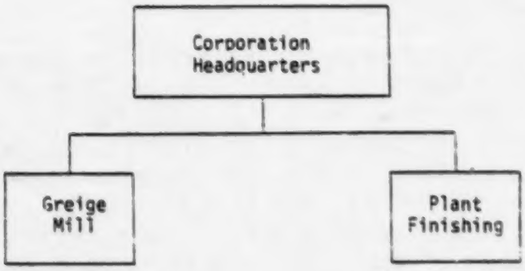

Corporation
Corporation Headquarters
Plant
Plant

CORPORATE HEADQUARTERS & DIVISIONS

(Divisions horizontally integrated)


Corporation Headquarters
Plant Finishing
Plant Finishing

(Divisions vertically integrated)


Corporation Headquarters
Greige Mill
Plant Finishing

Source: Development Planning and Research Associates, Inc.

In the parent-subsidiary organizations, the accounting system for separately incorporated plants is very similar to single plant operations with very little flexibility. The income statement may be consolidated with the parent corporation; however, separate systems are usually maintained. The impacts of pollution control costs on these plants would be about the same as on single plant operation. Corporate headquarters - division organizations have considerably more flexibility in the accounting systems and consequently, a much greater viability may be portrayed when compared to single plant operations. Accounting systems used in these organizations may incorporate cost or profit centers. With the use of these centers, the viability of individual plants can not be easily discerned. Consequently, the impacts of pollution control costs will be felt only at the corporate level. With horizontally integrated companies (one or more wet processors)the impact is going to be relatively great since all plants can be expected to be subjected to increased costs. Although the impacts are great they are not as severe as those of single plant operations since the indirect costs can be reduced by allocation to two or more centers. In the case of vertical organizations, this allocation of costs is much more flexible and the viability of a given plant is much less apparent.

In the cost center system, profits are not normally identified with the plants. Consequently, the impacts of pollution control can be ascertained only at the corporate level. A corporation with greige mills and finishing operations can absorb costs more readily than either single plant operations or horizontally organized multiplant operations. Under profit center systems, the profits between plants are normally allocated on a cost basis. Consequently, the costs will in effect be absorbed both by the greige mill and the finisher. This amounts to a partial price pass through.

3. Number of Plants and Firms

The number of plants and firms in the textile industry is discussed in this section. The section is divided into two parts. The first part describes the industry in aggregate form according to Census data. The second part of this section concentrates on the number of textile mills which are believed to be wet processors, that is, those facilities which are capable of generating wastewaters.

a. The Aggregate Industry

The aggregate number of establishments (mills and plants) and companies comprising each of the SIC industry groups (3 digit level) within the textile industry are shown in Table III-9 for the period 1963-1977. During this period, the total number of establishments remained fairly stable, fluctuating between 7,100 and 7,200. However, the total number of companies declined from over 6,300 in 1963 to approximately 6,100 in 1972, revealing a 1963 to 1972 tread towards greater concentration within the industry. However, the number of companies increased to over 6,200 in 1977. While the total number of textile mills has remained stable the numbers within

Table III-9, The textile industry, number of firms and establishments
(SIC Industry Group--3 digit level)

SIC Groups		Firms				Establishments			
		1963	1967	1972	1977	1963	1967	1972	1977
221	1/ Weaving Mills	1,160	1,097	947	925	1,507	1,483	1,293	1,228
225	Knitting Mills	2,719	2,530	2,462	2,408	2,848	2,698	2,723	2,617
226	Textile Finishing Except Wool and Knit	587	601	570	619	621	641	656	678
227	Floor Covering Mills	326	342	476	541	349	385	529	592
228	Yarn and Thread Mills	594	605	594	575	712	768	810	798
229	Misc. Textile Goods	978	984	1,089	1,160	1,067	1,105	1,193	1,254
	TOTAL	6,364	6,159	6,138	6,228	7,104	7,080	7,204	7,167

1/ Includes SIC 222, 223, and 224.

Source: Bureau of the Census, U.S. Department of Commerce the various industry groups have been somewhat more volatile. It should be noted that, to a great extent, this volatility represents reclassifications under the SIC system based on changes in the product mixes produced by the mills. It does not necessarily reflect the actual plant closings and openings. The greatest change among the industry groups occurred in the weaving mills with the number of establishments declining from over 1,500 in 1963 to about 1,200 in 1977. The knitting mills (SIC 225) showed a slight decrease with the number of mills going from over 2,800 in 1963 to about 2,600 in 1977. The greatest increase occurred in the floor covering mills (SIC 227) with the number of mills growing by 70 percent; an increase from 349 mills in 1963 to about 600 in 1977. The remaining industry groups saw moderate increases in their number, varying between 5 and 15 percent.

Table III-10 depicts the number of establishments for each of the SIC industries during the period 1963-1977. In Industry Group 221 (Weaving Mills), the most significant change involved the wool weaving and finishing mills which experienced a 60 percent decline during the period with the total number of mills dropping from 361 in 1963 to 165 in 1977. The total number of broad woven mills (SIC 221 and 222) remained constant, with a net increase of one mill between 1963 and 1977. However, among the two type industries there were wide fluctuations. The number of cotton mills (SIC 221) decreased by about 30 percent while the man-made fiber mills (SIC 222 increased by 26.5 percent. As point out previously, this reflects more a change in the classification of mills than it does in mill openings and closings.

In Industry Group 225 (knitting mills), the total number of hosiery, underwear, and outerwear mills decreased by about 25 percent during the period 1963-1977. The number of mills producing gloves and other products (SIC 2259) fluctuated between 60 and 80 during the period 1963-72 and then increased dramatically between 1972 to 1977, rising from 73 to 192. The bulk of the increase can be attributed to a 250 percent increase in the number of small plants (those that employ less than 20 workers) which climbed from 40 to 145. The number of knit fabric mills increased from 518 in 1963 to over 900 in 1972. In 1972, the knit fabric mills were reclassified into two separate SIC industries: circular (SiC 2257) and warp (SIC 2258).

Between 1972 and 1977, the number of circular knit fabric mills decreased about 200 mills with the total number dropping from 716 to 530. The number of warp knit fabric mills increased from 203 mills in 1972 to 235 in 1977.

The total number of plants in Industry Group 226 increased by about 7 percent with the number climbing from 621 in 1963 to 678 in 1977. The number of plants finishing woven fabric (SIC 2261 and 62) increased by about 10 percent from 443 to 495. Within these two SIC industries, the changes between the cotton and the man-made fiber plants paralleled those within the weaving industries. That is, in 1963, the cotton plants outnumbered the man-made fiber plants; however, in 1977 the man-made fiber plants outnumbered the cotton plants.

Table III-10. The textile industry, number of firms and establishments
(SIC Industries-4 digit level)

SIC	Industries	Firms				Establishments			
		1963	1967	1972	1977	1963	1967	1972	1977
221	WEAVING MILLS								
2211	Weaving Mills Cotton	229	218	190	211	407	393	307	314
2221	Weaving Mills Man-Made Fibers	227	272	256	268	355	396	412	449
2231	Weaving & Finishing Mills-Wool	304	262	178	154	361	310	198	165
2241	Narrow Fabric Mills	350	345	323	292	384	384	376	335
	TOTAL	1,160	1,097	947	925	1,507	1,483	1,293	1,263
225	KNITTING MILLS								
2251	Womens Hosiery	363	302	256	176	411	355	312	200
2252	Hosiery (n.e.c.)	504	423	375	382	528	448	415	415
2253	Knit Outerwear Mills	1,175	1,156	882	902	1,185	1,179	917	953
2254	Knit Underwear Mills	104	99	74	80	118	113	87	92
2256	Knit Fabric	487	489	--	--	518	541	--	--
2257	Circular Knit Fabric Mills	--	--	629	462	--	--	716	530
2258	Warp Knit Fabric Mills	--	--	174	215	--	--	203	235
2259	Knitting Mills (n.e.c.)	86	61	72	191	88	62	73	192
	TOTAL	2,719	2,530	2,462	2,408	2,848	2,698	2,723	2,617
226	TEXTILE FINISHING EXCEPT WOOL AND KNIT								
2261	Finishing Plants, Cotton	220	202	181	195	238	216	196	210
2262	Finishing Plants, Man-Made Fiber	193	212	200	246	205	233	259	285
2269	Finishing Plants (n.e.c.)	174	187	189	178	178	192	201	183
	TOTAL	587	601	570	619	621	641	656	678
227	FLOOR COVERING MILLS								
2271	Woven Carpets and Rugs	56	55	64	71	64	61	65	71
2272	Tufted Carpets and Rugs	167	210	334	397	181	244	381	449
2279	Carpet and Rugs (n.e.c.)	103	78	78	73	104	80	83	72
	TOTAL	326	342	476	541	349	385	529	592
228	YARN AND THREAD MILLS								
2281	Yarn Mills Except Wool	234	256	264	273	317	377	426	456
2282	Throwing and Winding Mills	165	159	177	172	180	181	212	196
2283	Wool Yarn Mills	136	127	92	71	144	135	99	76
2284	Thread Mills	59	63	61	59	71	75	73	70
TOTAL		594	605	594	575	712	765	810	798
229	MISC. TEXTILE GOODS								
2291	Felt Except Woven Felts & Hats	28	33	38	37	36	40	47	46
2292	Lace Goods	145	134	99	68	152	142	105	71
2293	Padding & Upholstery Filling	168	133	119	113	183	151	132	120
2294	Processed Textile Wastes	137	134	102	95	141	141	106	99
2295	Coated Fabrics Not Rubberized	149	157	184	175	162	178	202	191
2296	Tire Cords and Fabrics	12	12	9	8	20	20	18	20
2297	Nonwoven Fabrics	64	65	66	81	69	68	82	100
2298	Cordage and Twine	148	147	134	151	167	169	156	171
2299	Textile Goods (n.e.c.)	127	189	338	432	137	196	345	436
	TOTAL	978	984	1,089	1,160	1,067	1,105	1,193	1,254
TOTAL		6,364	5,773	6,138	6,228	7,104	7,080	7,204	7,202

Source: U. S. Department of Commerce, Bureau of Census, 1977

The total number of mills in Industry Group 227 (carpets) increased significantly going from 349 in 1963 to 592 in 1977. The increase reflects the dramatic jump in the number of tufted carpet mills which climbed from 181 in 1963 to 449 in 1977. The number of woven carpet mills remained fairly constant varying between 60 and 70 mills. Other carpet mills (Industry 2279) experienced a substantial decline with a decrease in the total number from 104 to 72 during the period.

The total number of mills in Industry Group 228 (yarn) increased from 712 in 1963 to 810 in 1972; it then dropped to 798 in 1977. In this group the yarn mills (SIC 2281) have shown a continued increase going from 317 to 456 during the period. The wool yarn mills (SIC 2283) have shown a significant and continued decrease dropping from 144 in 1963 to 76 in 1977. The other industries in the group have experienced a relatively stable level in their total numbers during the period.

In Industry Group 229 (miscellaneous), the total number of plants has remained relatively stable, fluctuating between 1000 and 1200. Several of the SIC industries have shown significant decreases including lace goods (SIC 2292), padding (SIC 2293) and processed textiles (SIC 2294). Industries showing appreciable increases in their total number include nonwoven fabrics (SIC 2297) and textile goods (n.e.c.) (SIC 2299).

In the knitting mills group, the number of mills producing knit apparel underwent a substantial decrease; these mills include those fabricating hosiery, outerwear, underwear, and gloves. In contract, the mills producing knit fabric experienced a dramatic increase reflecting the large production of double knit goods during the early 1970's. In 1963, the total number of mills producing knit fabric was just a little over 500. By 1972, the number had almost doubled to over 900 mills. It should be noted that between 1963 and 1972, the knit fabric segment (SIC 2256) was split into two separate industries under the SIC system: circular knit (SIC 2257) and warp knit (SIC 2258) fabric mills. As a consequence, the dramatic increase may have resulted to a degree from a reclassification of small mills and, as pointed out previously, it does not necessarily represent the actual opening of 500 new mills. In 1977 the knit fabric mills numbered 765, a decrease from 1972.

During the period 1963-1972, the number of textile finishing plants increased by close to 5 percent. The changes in the number of plants finishing cotton fabric and those finishing man-made fabric primarily reflects the change in the production of the two types of fabrics as discussed for the weaving mills. The actual number of finishing plants in operation changed only slightly increasing by about 40 plants.

The dramatic change in the number of floor covering mills occurred because of a doubling of the number of tufting mills (SIC 2272) from about 180 in 1963 to nearly 450 in 1972. There was very little change in the number of mills producing woven carpets (SIC 2271). The other type of mills, SIC 2273, experienced a significant decline in its number.

b. "Wet" Processors

Because the textile industry is comprised of a diverse group of establishments, many which are essentially dry and thus would not be affected by wastewater regulations, the Technical Contractor conducted a major survey of the facilities in SIC 22. The survey resulted in the development of a master list of those textile mills believed to have wet production operations. This master list was developed based on information from several sources including the Standard Industrial Classification (SIC), the Census of Manufactures, data collected during previous textile industry studies, information from trade associations, and information contained in a commercial directory, Davison's Textile Blue Book.

As a result of this effort the Technical Contractor developed a master list consisting of 1,777 wet production facilities. Table III-11 depicts these facilities according to their respective functional subcategories. It should be noted there were 1,165 mills classified in the nine functional subcategories which were considered to be wet processors. Additionally there were 612 mills classified as low water use processing operations. These low water use operations are predominately greige mills with weaving and slashing operations.

4. Size of Plants and Firms

Information used to indicate mill size can be obtained from the Census of Manufactures. Using the number of employees as a basis for mill size, the textile industry was grouped into four size levels. Included as divisions were: small, medium, large, and extra-large mills. The mills which form the small category employed 1 to 19 workers, those in medium-sized mills engaged 20 to 99 employees, 100 to 999 were classified as large, while extra-large mills were defined as employing over 1,000. Table III-12 depicts the four size levels for each SIC industry group and provides totals for each level in the textile industry as of 1977. In the aggregated industry, 2,698 (37 percent) of the 7,203 mills were classified as small mills, 32 percent were defined as medium, 29 percent fit into the large category with the remainder (2 percent) employing greater than 1,000 workers. It can be determined from this data that the majority of the mills are relatively small. Specifically, 70 percent of all textile mills employed less than 100 employees in 1977.

When the groups were analyzed on an individual basis, it was determined each varies independently of the others. The weaving mills, for example, reported that of 1,427 mills, 535 (37 percent) employed one to 19 workers. The large level also accounted for 37 percent of the mills. Twenty-two percent at the medium level, and 4 percent operated at the extra-large employment level, the largest percentage at this employment size among the textile subcategories.

Table III-11. Wet processors, in the textile industry

Functional category	Total mills listed
Wool scouring	17
Wool finishing	37
Low water use processing	612
Woven fabric finishing	336
Knit fabric finishing	282
Hosiery products	160
Carpet finishing	58
Stock and yarn finishing	217
Nonwoven manufacturing	38
Others (felted fabric processing)	20
TOTAL	1,777

Source: Sverdrup and Parcel and Associates, Inc.

Table III-12. Total number of establishments by classification, by size

	Weaving Mills	Knitting Mills	Floor Covering Mills	Yarn & Thread Mills	Dyeing & Finishing Mills	Miscellaneous Textile Goods	Total
Total establishments	1,263	2,617	592	798	678	1,254	7,202
Small (1-19 employees)	454	1,106	307	190	283	731	3,071
Medium (20-99 employees)	271	922	154	189	221	351	2,108
Large (100-999 employees)	482	564	123	408	167	170	1,914
X-large (1,000-over employees)	56	25	8	11	7	2	109

Source: U.S. Department of Commerce, Census of Manufactures, 1977.

The remaining industry groups are discussed below based on data depicted in Table III-12.

a. Knitting Mills (Industry Group 225)

Knitting mills were evenly distributed among small and medium firms. The small mills accounted for 42 percent of the total, 2,617 mills, whereas the medium-sized mills amounted to 35 percent. Collectively, the small and medium levels comprised 77 percent of all knitting mills. In addition, 22 percent of the mills maintained an employment level of 100 to 999 workers, while the remaining one percent of the knitting mills were classified as extra-large.

b. Floor Covering Mills (Industry Group 227)

Mills in this group were relatively small in comparison to the mills in the other groups of the textile industry. Floor covering mills accounted for 592 mills of which 307 mills, or 52 percent, employed less than 20 workers. Twenty-six percent of the mills were of medium size. Grouping the small and medium employment levels together resulted in 78 percent of the floor covering mills maintaining employment levels of less than 100 workers. The large and extra-large mills accounted for the remaining 21 percent and 1 percent respectively.

c. Yarn and Thread Mills (Industry Group 228)

This group consisted of a total of 798 mills. Among the yarn and thread mills, large mills predominated, the employment level of 100 to 999 employees with 51 percent, or 408 mills. The small and medium levels each comprised an additional 24 percent. Similar to the other groups in this industry, the number of mills employing over 1,000 workers was small as only 1 percent of the mills in the yarn and thread category reported this level of employment.

d. Dyeing and Finishing Plants - Excluding Wool (Industry Group 226)

This group differed from the other groups in its distribution of employees. In the dyeing and finishing plants, the small, medium, and large employment levels were about the same size. Specifically, the small level accounted for 42 percent of the mills, 33 percent were at the medium level, and 25 percent were classified as large. This was the only group in the industry with such an even distribution of employment levels. Only one percent of the mills in this category employed over 1,000 workers.

e. Miscellaneous Textile Goods (industry Group 229)

The great diversity between mills in this group accounted for the majority (58 percent) of the total 1,254 mills reporting employment figures in the small size level. An additional 28 percent classified as medium-sized mills resulted in 86 percent of the miscellaneous textile goods mills maintaining employment levels of less than 100 workers. Only 14 percent of the mills were large while one percent were in the extra-large size division.

f. Size of Plants by Functional Subcategories

While the above text and data presented in Table III-12 presents the plant sizes according to Census employment groupings, size information was also obtained for a majority of the facilities believed to be "wet" processors which appeared on the master list developed by the Technical Contractor. Table III-13 presents the total number of facilities for each "wet" functional category, the number of facilities which either did or did not furnish production information, and for those who did provide information, their respective responses by production size ranges. As shown in Table III-13, the majority of the respondents produced less than 13 kkg/day. This was also true for most of the functional categories with the notable exceptions being the wool scouring, low water processing, and carpet finishing categories.

It should be noted data in Table III-13 were based in terms of wet production which is dependent on the weight of the material found in the final product. Thus mills producing light weight products such as hosiery and other sheer knit goods occupy the smaller production ranges while mills manufacturing heavy weight woven goods (upholstery and drapery fabric) and carpet occupy the larger production ranges.

5. Location of Plants (Mills)

Textile mills were among the first types of industrial plants established in this country. As a result, the early centers of the industry were in the New England and Southern states. While textile mills are geographically distributed throughout 37 states according to the 1972 Census, the heaviest concentrations remain in the Northeast and South. Table III-14 shows that five states, New York, New Jersey, Pennsylvania, North Carolina and Georgia, comprised 59% of the 7,202 mills operating in the United States in 1977. The textile industry is divided into four geographic regions; Northeast, South, North Central, and West. These regions are subdivided into two or three divisions consisting of several states each. The South region is the largest area of concentration accounting for 3,037 of the total 7,202 mills. Within this region, the South Atlantic division contains 86% of the area total. The majority (1,365) of the plants are located in North Carolina. The South region is closely followed by the Northeast region in terms of total mills. This region consists of 42% of the total in comparison to 40% in the Northeast. The heaviest concentration is found in the South Atlantic area, specifically North Carolina. The North Central and West region provide relatively few mills, amounting to 8% of the total figure. These extremities in geographical distribution of textile mills provide for one of the most fragmented industries in the United States (Exhibit III-2).

Table III-14 also depicts the geographic location of the mills by the Standard Industrial Classification system (SIC codes) and into plants which employ twenty or more workers. Of plants with twenty or more employees, the South accounts for an even greater share of the total, with 52% of the plants while the Northeast comprised 36%.

Table III-13. Production ranges of responding mills on master list

Functional category	Total no. wet mills	Mills for which no data rcvd.	Mills for which data provided	Percent of respondents by production ranges (kkg/day)				
				0-4	4-13	13-34	34-68	above 68
Wool scouring	17	1	16	31	6	38	25	0
Wool finishing	37	4	33	52	33	9	6	0
Low water use processing	612	504	108	16	28	41	11	5
Woven fabric finishing	336	96	240	26	25	23	13	13
Knit fabric finishing	282	59	223	31	28	31	7	3
Hosiery products	160	24	136	88	11	1	0	0
Carpet finishing	58	8	50	8	20	26	26	20
Stock and yarn products finishing	217	19	198	40	29	23	7	2
Nonwoven manufacturing	38	13	25	24	24	32	16	4
Other (felted fabric processing)	20	5	15	73	20	0	7	0
All categories	1,777	733	1,044	37	25	23	9	6

Source: Sverdrup & Parcel and Associates, Inc.

Table III-14. State and regional location of textile mills, 1977

Geographic location	Weaving Mills (SIC 221)		Knitting Mills (SIC 225)		Floor Covering Mills (SIC 227)		Yarn and Thread Mills (SIC 228)		Dyeing and Finishing Textiles, exc.wool (SIC 226)		Misc. Textile Goods (SIC 229)		Total	
	total	20 or more emp.	total	20 or more emp.	total	20 or more emp.	total	20 or more emp.	total	20 or more emp.	total	20 or more emp.	total	20 or more emp.
Northeast Region	464	258	1,321	691	37	20	187	118	336	136	512	211	2,857	1,494
New England Division	206	145	88	67	5	3	74	57	91	60	169	80	633	412
Maine	25	21	2	1			12	10			8	6	47	38
New Hampshire	22	18	8	6			4	3	4	3	3	2	41	32
Rhode Island	77	51	14	10	5	3	16	9	30	20	54	24	196	117
Massachusetts	61	42	41	33			30	24	41	27	86	(35)	259	161
Connecticut	21	13	20	15			12	11	15	10	18	13	87	62
Vermont			3	2									3	2
Middle Atlantic Division	258	113	1,233	624	32	17	113	61	245	136	343	131	2,224	1,082
New York	114	29	791	377	8	4	33	8	99	42	169	61	1,214	521
New Jersey	58	26	209	88	1	1	26	9	93	70	108	42	495	236
Pennsylvania	86	58	233	159	23	12	54	44	53	24	66	28	515	325
South Region	584	492	1,024	682	412	213	520	453	212	168	285	145	3,037	2,153
South Atlantic Division	494	425	866	567	301	190	454	395	193	155	212	106	2,600	1,838
Delaware									1	1			1	1
Maryland	4	4							4	1			8	5
Virginia	35	30	29	24	2	2	12	11	13	10			91	77
W. Virginia			1	1										
N. Carolina	171	144	700	447	40	9	268	235	78	64	108	51	1,365	950
S. Carolina	185	173	54	42	21	13	66	59	41	37	43	28	410	352
Georgia	93	71	42	31	318	166	108	90	50	39	61	27	672	424
Florida	6	3	40	22					6	3			52	
E. South Central Division	60	53	143	105	19	13	63	55	19	13	38	25	342	264
Tennessee	14	10	77	56	11	6	19	14	13	8	17	8	151	102
Kentucky			7	7	1	1	1	1			6	5	15	14
Alabama	44	41	49	33	6	5	42	39	6	5	13	10	160	133
Mississippi	2	2	10	9	1	1	1	1			2	2	16	15
W. South Central Division	30	14	15	11	12	10	3	3			35	14	95	52
Texas	29	13	10	7							28	9	67	29
Arkansas	1	1	2	2	4	4	1	1			2	2	10	10
Oklahoma					8	6	2	2					10	8
Louisiana			3	2							5	3	8	5
North Central Division	11	5	43	35	7	4	5	5	3	7	61	35	136	89
E. North Central Division	11	5	36	28	5	3	5	5	9	7	56	32	122	80
Ohio	8	4	12	8					1	1	22	16	43	29
Illinois	3	1	8	6	3	1	1	1	7	5	9	6	31	20
Michigan			1	1					1	1	11	5	13	7
Wisconsin			15	13	1	1	4	4			11	4	31	22
Indiana					1	1					3	1	4	2
W. North Central Division			7	7	2	1					5	3	14	11
Nebraska					2	1							2	1
Minnesota			6	6							1	1	7	7
S. Dakota											1	1	1	1
Iowa			1	1							3	1	4	2
West Region	64	19	114	58	71	37	19	11	41	10	92	34	401	169
Pacific Division	64	19	112	56	71	37	19	11	41	10	92	34	399	167
California	57	14	101	48	71	37	19	11	41	10	92	34	381	154
Oregon	6	4	4	4									10	8
Washington	1	1	7	4									8	5
Mountain Division			2	2									2	2
Idaho			1	1									1	1
New Mexico			1	1									1	1
Mills not specified according to location:	140	35	115	46	65	11	67	21	90	14	304	98	771	227
United States TOTAL:	1,263	809	2,617	1,511	592	285	798	608	678	395	1,254	523	7,202	4,131

( ) an estimate

As has been discussed previously, the SIC system categorized the textile industry into six industry groups. Included as industry groups are: Weaving Mills (SIC 221-224), Knitting Mills (SIC 225), Floor Covering Mills (SIC 227), Yarn and Thread Mills (SIC 228), Dyeing and Finishing Textiles - excluding Wool (SIC 226), and Miscellaneous Textile Goods (SIC 229). The locational characteristics of each of these major groups are discussed below.

a. Weaving Mills

The mills in the weaving mills groups are almost equally divided into the Northeast and South regions. The South makes up 584 of the 1,263 total plants in this segment while the Northeast accounts for 464 mills. The combination of these regions supplies the textile industry with 83% of the total weaving mills. Specifically, North Carolina, South Carolina, New York, and Pennsylvania contain the majority of plants in these regions, maintaining 171 and 185 mills respectively in the southern two states, and 135 and 125 respectively in the two northern states. Five percent of the weaving mills are found in the North Central and Western regions.

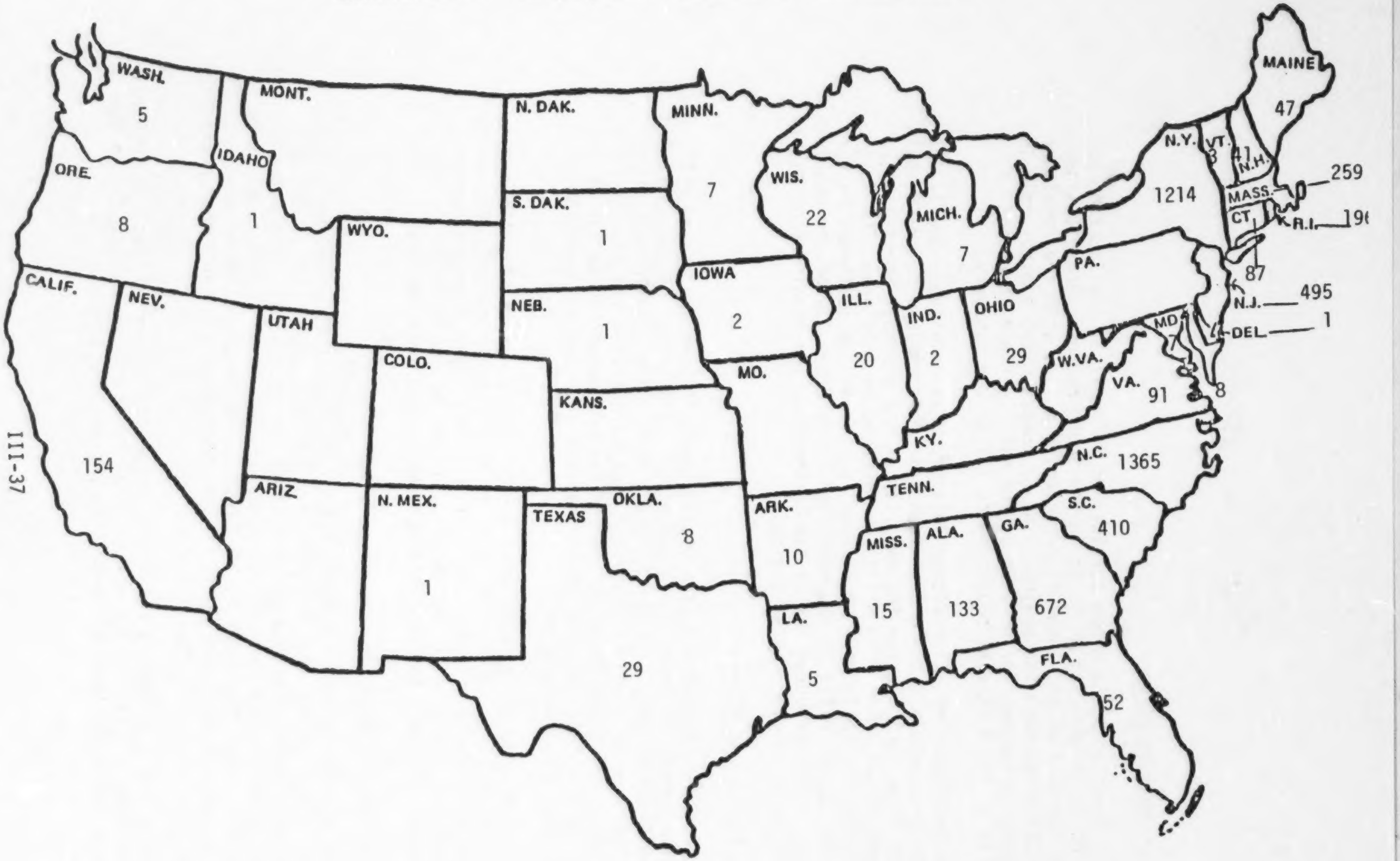
For the weaving mills groups, 809 establishments of the segment's 1,263 total mills employed 20 or more employees. The location of these weaving mills reporting twenty or more employees is similar to the total weaving mills geographic distribution. For example, 492 of the total 809 mills are located in the Southern region. Within this Southern region, South Carolina is the major contributor of woven goods, with 173 mills having 20 or more employees. The Northeast region represents 32% (258 establishments) of the larger mills, while the North Central and West regions supply the remaining portion.

b. Knitting Mills

The Northeast region represents 51% of the total knitting mills. The second largest locational area of knitting mills is the South which accounts for 39% of the 2,617 mills in this category. The remaining knitting mills are found in the West and North Central regions which contain 4% and 2%, respectively, of the mills.

Within the total knitting mill group, 58% of the knitting mills, (1,511 establishments) employ twenty or more workers. This indicates that the majority of the mills are relatively large. The greatest concentration of these larger mills are located in the Northeast region. This area accounts for 691 mills, or 46% of the total 1,725 mills. The South region represents 682 mills, while the North Central and West regions collectively account for 93 mills.

Exhibit III-2. Geographical location of textile mills 1/


WASH.
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WYO.
S. DAK.
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IOWA
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ILL.
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IND.
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OHIO
29
PA.
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495
MD
7
DEL.
1
CALIF.
154
NEV.
UTAH
COLO.
NEB.
1
KANS.
MO.
W.VA.
VA.
91
8
KY.
N.C.
1365
TENN.
ARIZ.
N. MEX.
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TEXAS
29
OKLA.
8
ARK.
10
MISS.
15
ALA.
133
GA.
672
S.C.
410
LA.
5
FLA.
52

1/ Geographical location for 771 mills was unspecified.
Source: Census of Manufactures - 1977.

c. Floor Covering Mills

The floor covering mills group consists of 592 mills. The location of 70% of the floor covering mills is in the South region. Georgia alone accounts for 54 % of the total floor covering mills, with the remainder distributed throughout the region. The northeast plays a minor role in this group, accounting for only 6% of the mills. The west region is comparable to the Northeast amounting to 12% of the category.

Although the number of mills within this group is relatively small, 48% of the mills maintain a payroll of twenty or more employees. Here again the South is accountable for the majority of the plants. Specifically, 75% of the larger mills (213 mills) are located in this area. The West region plays a slightly more significant part than the Northeast in this group. The larger mills in the West region represent 13% of the total in comparison to 7% accounted for by the Northeast. The remainder of plants are found in the North Central region.

d. Yarn and Thread Mills

The South region is credited with having the most yarn and thread mills in the United States. This area represents 65% (520 mills) of the total 798 mills now manufacturing yarn and thread. North Carolina alone accounts for 268 mills, with South Carolina and Georgia totaling 174 plants. In the Northeast, yarn and thread mills are sparse, amounting to 23% of the mills in this segment. The North Central and West regions contribute five and 19 mills, respectively.

The yarn and thread group represents a significant number of mills with 20 or more employees, having 608 mills in that classification. The mills are geographically distributed similarily to the total yarn and thread mill segment distribution. The majority of the mills are found in the South region, followed by the Northeast, West, and North Central.

e. Dyeing and Finishing Plants - Excluding Wool

The dyeing and finishing group consists of the fewest establishments found within any group of the textile industry. In this group, 336 of the 678 plants are distributed within the Northeast region. Within this region New York and New Jersey have plants totaling 192, which is over one-fourth of the total number of plants in the group. The South region accounts for 212 plants, or 31%, with the North Central and Western regions each providing 1%.

The majority (58%) of dyeing and finishing plants employ at least 20 workers. This represents a total of 395 plants with 196 in the Northeast, 212 in the South, 9 in the North Central, and 41 in the West regions.

f. Miscellaneous Textile Goods

This group is the most diversified of those within the textile industry and it is the third largest, accounting for 1,254 mills. Forty-one percent (512 mills) are in the Northeast region. New York accounts for 169 of the 512 mills within this region; New Jersey is next with 108 mills. The South contains 285 mills followed by 92 in the West region, and 60 mills in the North Central.

The majority of the mills represented in the miscellaneous textile goods group employ fewer than 20 employees. Only 42% of the mills reported more than 20 workers, the greatest portion of which were located in the Northeast region. The South accounts for 23% of the larger mills while the North Central and West regions collectively account for 12%.

g. "Wet Processors"

The geographical distribution of the "wet processors" is shown in Table III-15. As shown, the distribution is very similar to that based on the Census data. Over half of the wet production facilities are located in the southeast (EPA Region IV), particularly the Carolinas and Georgia. Another 25 percent are in the Northeast (New England, New Jersey, and New York). Less than 5 percent of the "wet processors" are located in the west (EPA Regions VI through X).

6. Level of Technology

During the past twenty years significant changes in technology have affected the textile industry. While each industry has experienced unique changes, the generally accepted cause for many of the changes for all categories was developments in man-made fibers. In a recent study by the Department of Treasury [1], the major textile technological changes were identified and assessed. While the objective of the Treasury study was an evaluation of capitalization rates in the industry, it did provide an overview of the technological changes experienced by each of the groups. These are summarized below. The accompanying tables are those contained in the study and have not been updated since the data are not available in publications.

a. Weaving

Significant changes in weaving technology began during the early 1950's with the introduction of shuttleless looms and developments to increase operating efficiency of the older conventional shuttle looms. As shown in Table III-16, the number of conventional looms has declined consistently since 1950 from 650,000 looms to 280,000 in 1974. While much of this decline is a result of the exit of weaving mills from the industry, portions of the decline are attributable to increased operating efficiency of existing looms and the introduction of shuttleless looms. Shuttleless looms were originally introduced during the mid-1950's but the number was relatively insignificant due to the limited capabilities of the early machines.

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[1] U.S. Department of the Treasury, The Textile Industry, 1976.

Table III-15.
Geographical distribution - mills on master list

Manufacturing Subcategory	EPA Region[1]										All Regions
	I	II	III	IV	V	VI	VII	VIII	IX	X	
Wool Scouring	6	1	3	3	0	3	0	0	0	1	17
Wool Finishing	20	2	4	3	1	1	1	1	0	4	37
Low Water Use Processing	60	75	72	390	6	7	0	0	2	0	612
Woven Fabric Finishing	69	54	34	155	11	3	1	2	7	0	336
Knit Fabric Finishing	27	58	45	134	9	1	2	0	6	0	282
Hosiery Products	2	2	9	139	5	2	0	0	0	1	160
Carpet Finishing	0	1	4	39	1	4	0	0	9	0	58
Stock & Yarn Finishing	33	19	31	120	6	3	1	0	4	0	217
Nonwoven Manufacturing	10	3	4	11	7	2	0	0	1	0	38
Felted Fabric Finishing	7	2	3	3	2	0	0	0	3	0	20
All Subcategories	234	217	209	997	48	26	5	3	32	6	1777

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[1] EPA Regions represent the following states:
I Conn., N.H., Maine, Mass., R.I., Vermont
II Del., N.J., N.Y., Puerto Rico, Virgin Islands
III MD, PA, VA, W. VA
IV Ala., Fla, GA, Miss., N.C., S.C., Tenn.
V Ill., Ind., Mich., Minn., Ohio, Wisc.
VI Ark., La., N.M., Okla., Texas
VII Iowa, KS, MO, Neb.
VIII Colo., Mont., N.D., S.D., Utah, Wyoming
IX Ariz., Calif., Guam, Hawaii, Nev.
X Alaska, Idaho, Oregon, Washington

Source: Sverdrup & Parcel and Associates, Inc.

Table III-16. Broad woven looms in place, United States

Year	Conventional	Shuttleless	Total	Output (Million linear yds)
1950	650,000	NA	650,000	NA
1957	613,000	NA	613,000	12,114
1959	499,000	NA	499,000	12,412
1961	459,000	NA	459,000	11,863
1963	464,000	NA	464,000	12,104
1965	495,000	NA	495,000	13,430
1967	415,000	NA	415,000	12,785
1968	386,000	NA	386,000	12,923
1969	377,000	9,000	386,000	12,591
1970	349,000	11,000	360,000	11,454
1971	329,000	13,000	342,000	11,147
1972	310,000	20,000	330,000	11,292
1974	280,000	30,000	310,000	10,721

Source: Department of Treasury, The Textile Industry, 1976.

By 1969, improvements in the design of shuttleless looms made them more attractive to the industry. Accordingly, shuttleless looms began to replace conventional looms either in existing mills or were used in lieu of conventional looms in new mills. Although the initial cost for shuttleless looms was considerably higher (up to four times) than conventional looms, their speed and efficiency made their purchase attractive. One additional factor contributing to the attractiveness of the shuttleless looms is their ability to operate at reduced noise levels. This is presently a significant factor as the industry is being required to reduce noise levels in weaving mills.

b. Knitting

In knitting, the major advances in technology have been associated with women's hosiery and double knit fabrics. Technological advances in this group have included developments in man-made fibers and the evolution of new machinery which was necessary to handle the man-made fibers.

Following World War II, nylon almost totally replaced silk and rayon in the production of women's hosiery because of its strength and capability of being drawn in fine deniers. With the dominate use of nylon, narrow guage knitting machines became practical and thus nylon hosiery began to replace full fashion hosiery (silk). These trends are illustrated in Table III-17 which depicts the declining number of full fashion machines and the increasing number of circular knit machines. Table III-17 also depicts the technological advancements in developments of the circular machines which is illustrated by the increasing number of multi-feed machines. These multi-feed machines have all but replaced the less efficient single feed machines. These advances in machinery coupled with developments in stretch yarns, have resulted in the introduction of tubular hosiery and panty hose which have completely dominated the hosiery market.

The development of textured polyester fibers during the late 1950's enabled the creation of the double-knit market in the early 1960's. As shown in Table III-18, the number of double-knit machines rapidly increased from 1963 to 1973. Also, as the double-knit markets grew, the industry replaced older, smaller machines with larger, more efficient machines (larger number of feeds). In 1974, the total number of machines declined because of a peak in the demand for double-knit fabrics and the trend for the larger multi-feed machines.

c. Dyeing and Finishing

With the developments in man-made fibers and changes in the fashion industry, significant changes in technology have occurred in dyeing and finishing. With the increased requirements for versatility in dyeing and finishing operations, older relatively simple equipment has been replaced with modern sophisticated equipment. Table III-19 illustrates this trend as the older style roller printing machines have been replaced by the newer, more

Table III-17. Hosiery knitting machines, 1950-1972

Year	Number of full fashioned machines	Circular machine 1 feed	Circular machine 2 feed	Circular machine 4 feed	Circular machine 6, 8 feed
1950	2,575	-	-	-	-
1953	2,830	-	-	-	-
1956	2,190	-	-	-	-
1960	1,310	35,394	5,092	-	-
1963	520	43,037	28,618	5,270	-
1966	140	37,932	42,516	49,915	6,690
1969	20	30,642	53,488	54,300	76,940
1972	5	11,588	55,444	63,855	84,140

Source: Dept. of Treasury, The Textile Industry, 1976

Table III-18. Double knit machines in place, 1963-1964

Year	Number of Machines	No. of feeds (% of Total) 24	36	48 and over
1963	1,800	65	34	1
1966	3,400	58	38	4
1970	10,000	50	35	18
1972	22,000	25	45	30
1973	24,000	20	45	35
1974	23,000	18	43	37

Source: Dept. of Treasury, The Textile Industry, 1976

versatile, more efficient machines. With respect to changes in the level of technology associated with dyeing operations, Table III-20 illustrates the decrease in the more traditional methods and the increase of the newer, higher temperature dyeing methods.

d. Yarn

Two significant advances in yarn preparation technology are the development of texturized yarn and the automation of open-end spinning systems. The developments of texturized yarns were necessitated by the increased utilization of man-made fiber yarns. Since the early 1960's, throwsters have crimped and stretched man-made fibers to produce yarn similar to qualities of natural fiber yarns. With the increased utilization of man-made yarns, there was a need for the development of faster, more efficient machinery capable of creating this false twist texturing characteristic. This need was met by the development of extremely fast spindles. Table III-21 illustrates the development and implementation of these faster spindles. As shown, in 1956 there were 20,000 spindles in place operating at speeds of 40,000 RPM. By 1973, these had all been replaced with machines operating at considerably higher speeds (over half a million spindles operating at 400,000 RPM alone).

The second technological advance in the yarn preparation was the automation of open-end spinning. This type of spinning, which handles only selected yarn counts, is capable of producing two to five times more yarn per machine than conventional ring spinning.

e. Carpet

The major technological advances in carpet manufacturing have involved tufting. Tufting, which produces carpets at a speed of about six times faster then weaving, was first introduced into the industry in the early 1950's. However, tufting did not gain a dominant share of the market until 1958, when bulked continuous filament nylon was developed for commercial use. Table III-22 shows both how tufting has virtually taken over the carpet market and how the use of face yarns has shifted to nylon and other man-made fibers.

f. Miscellaneous Textile Products (Nonwoven fabrics)

In the 1960's, production of nonwoven fabrics was primarily limited to interlinings and disposable products such as towels and diapers. Since then, these type fabrics have made significant inroads into other markets. Technological advances are numerous and, as the demand for such products continues to increase, additional advances are expected.

Table III-19. Printing machines in place, U. S.* for selected years

	1963	1965	1973
Roller Printing Machines	460	450	394
Screen Printing Machines			
Flat Bed, Screen	310	300	211
Flat Bed, Rotary Screen	-	20	136
Transfer Printing Machines	-	-	77
Stripe Printing Machines	-	-	16

*Does not include carpet equipment.

Source: Dept. of Treasury, The Textile Industry, 1976

Table III-20. Piece goods dyeing machines in place, U.S.*
(units)

Year	Jet Dyeing Machs.	Pressure Dyeing Machs.	Atmo-spheric Dyeing Machs.	Jig Dyeing Machs.	Padder Dyeing Machs.	Con-tinuous Dyeing Ranges
1960						
1963	6	34	5,000	3,800	650	
1964	7	56	4,980	3,680	648	
1965	12	65	4,902	3,510	646	200(30)**
1966	33	98	4,880	3,480	644	
1967	67	160	4,790	3,460	642	
1968	117	230	4,750	4,208	640	
1969	201	400	4,602	2,804	638	
1970	374	650	4,510	2,440	636	
1971	599	750	4,350	2,208	634	
1972	758	810	4,150	2,110	632	
1973	858	810	4,048	1,957	630	295(132)**

*Non-carpet machines.
**(Thermosol-pad steam ranges).
Source: Dept. of Treasury, The Textile Industry , 1976

Table III-21. Number of equivalent false twist spindles in place by RPM, U.S.

Mid Year	40,000 RPM	120,000 RPM	240,000 RPM	345,000 RPM	400,000 (Single & Double Heater)
1956	20,000				
1957	25,000				
1958	28,000	2,000			
1959	11,000	25,000			
1960	11,000	27,000			
1961	11,000	31,000			
1962	11,000	36,000			
1963	11,000	40,000			
1964	11,000	42,000	10,600		
1965	11,000	52,000	32,000		
1966	9,000	53,000	52,000		
1967	8,000	53,000	60,000	13,000	
1968	6,000	53,000	66,000	32,000	
1969	4,000	53,000	66,000	102,000	
1970	-0-	50,000	66,000	114,000	70,000
1971	-0-	46,000	66,000	124,000	149,000
1972	-0-	40,000	66,000	130,000	309,000
1973	-0-	38,000	66,000	140,000	556,000

Source: Department of Treasury, The Textile Industry , 1976

Table III-22. The relationship between the growth of tufted carpet manufacturing and the use of man-made fibers between 1954 and 1974

Year	Tufted carpets as a percent of total broadloom shipments	Percentage of face yarns used in the manufacture of tufted carpets by type			
				Man-made fibers	
		Cotton	Wool	Rayon & acetate	Nylon & other MMF
1954	32.6%	74.3%	0%	24.7%	0%
1958	58.1	13.0	22.5	45.2	19.3
1967	88.8	3.6	5.5	15.6	74.4
1974	97.5	0.2	0.8	0.4	98.6

Source: Department of Treasury, The Textile Industy, 1976.

C. Employment Characteristics

The textile industry employs approximately five percent of all manufacturing industry workers. The characteristics of textile employees, with emphasis on the number of workers and the wages for each SIC industry group, are discussed in this section.

1. Industry Employment

Between 1966 and 1974, the employment level of the industry varied between 950,000 and a million except in 1969 and 1974 when it exceeded the one million mark (Table III-23). In 1975 the level dropped under 900,000. It has remained about 900,000 since that period. Employment in the industry has amounted to just over 40 percent of the combined employment in both textiles and apparel with the percentage increasing from 41 percent in the 1960's to 42 percent in the early 1970's. In 1968 and 1979 it was 40 percent.

As shown in Table III-24 (the totals in this table do not correspond with those in Table 23; the data were obtained from different sources), over 300,000 workers or a third of all textile workers were employed in the weaving mills (Industry Group 221-224) in 1977. Seventy thousand or 8 percent of all textile workers were employed in dyeing and finishing (Industry Group 226). The combined employment in the two groups amounted to 42 percent of the total industry employment. The knitting mills group, which had twice as many establishments as the weaving mills groups, accounted for only 27 percent of the textile employment with about 235 thousand workers. There were 140 thousand workers employed in the yarn and thread mills group which amounted to about 16 percent of the industry employment. Over 55 thousand workers were employed in the floor covering mills group which was about 6 percent of the textile employment.

When viewing the trends of the individual groups, it is apparent that the number of employees in the weaving and knitting mills experienced a decline from 1967 to 1973 while the number in the other segments generally showed an increase as shown in Table III-25. After 1973 all groups have shown a decline in their total levels although the trends have stabilized in the last two years. The employment level in the weaving group has decreased from 380,000 in 1967 to about 300,000 in 1977. Employment in this group reached a low in 1975 dropping below the 300,000 level. Employment in the knitting mills group increased from 240,000 in 1967 (not shown in the table) to over 275,000 in 1972; later data is not available for the entire group. The knit fabric industries (SIC Industry 2257 and 2258) showed a significant drop of about 15,000 employees from 1972 to 1977. Since then the levels have stabilized at around 75,000 employees. Employment in the dyeing and finishing plants (Industry Group 226) has remained at relatively consistent levels around 72,000 employees. The maximum level was reached in 1973 with over 80,000 workers while a low occurred in 1975 with the level dropping below 70,000. The employment level in the floor covering group increased from 44,000 in 1967 to over 60,000 in 1973. Since 1973 it dropped to 49,000 in 1975 and 1976. In 1977 it climbed back to a level in excess of 50,000. The trend in employment in the yarn and thread mills group was similar to that of floor covering. The level climbed from under 120,000 in 1967 to close to 160,000 in 1973 and then declined to 140,000 in 1977.

Table III-23. Total employment in all manufacturing, textile, and apparel (in thousands)

Period	All Manufacturing Industries	Textiles and Apparel	Textile Industry 1/	Textile Mills as a Percent of Textiles and Apparel
				(%)
1965	18,062	2,271	925.6	41
1966	19,214	2,365	963.5	41
1967	19,477	2,357	956.7	41
1968	19,781	2,400	993.9	41
1969	20,168	2,412	1,002.5	42
1970	19,371	2,339	975.0	42
1971	18,623	2,297	954.3	42
1972	19,150	2,369	985.8	42
1973	20,153	2,448	1,009.6	42
1974	20,080	2,328	965.3	42
1975	18,320	2,111	867.7	42
1976	19,003	2,238	919.1	41
1977	19,688	2,227	910.4	41
1978	20,507	2,232	899.3	40
1979	21,062	2,201	888.7	40

1/ Total employment in the textile industry represented 5 percent of the employment in all manufacturing industries during the period 1965-1979; since that period it has declined to 4 percent.

Source: Bureau of Labor Statistics.

Table III-24. Number of employees and production workers--
Textile Industry, 1977

Industry Groups	SIC	All employees Number	All employees Percent of total	Production workers	Production workers as a percent of all employees
		(1,000)	(%)	(1,000)	(%)
Weaving Mills	221-224	303.6	35	272.6	90
Knitting Mills	225	235.9	27	206.0	87
Dyeing and Finishing	226	72.1	8	59.8	83
Floor Covering Mills	227	55.8	6	44.3	79
Yarn and Thread Mills	228	140.4	16	127.3	91
Miscellaneous Textile Goods	229	67.8	8	54.8	81
TOTAL		875.6	100.0	764.8	87

Source: 1977 Census of Manufactures.

Table III-25. Number of employees--textile industry, 1967-1977
(in thousands)

Industry Groups	SIC	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Weaving mills	221-224	379.4	378.4	367.1	347.1	325.6	317.5	325.6	319.9	292.0	306.5	303.6
Knitting Mills[1]	225	204.4	217.7	223.0	204.4	192.4	186.4	NA	NA	NA	NA	160.4
Knit Fabric Mills[2]		NA	NA	NA	NA	NA	90.1	93.1	86.0	75.7	75.2	75.5
Dyeing and Finishing	226	73.7	73.8	74.5	72.5	73.5	79.7	80.5	74.6	68.0	71.9	72.1
Floor Covering Mills	227	43.6	49.5	55.0	54.7	53.0	59.9	60.7	57.0	48.6	49.2	55.8
Yarn and Thread Mills	228	119.1	125.8	130.1	128.8	133.4	147.8	157.2	150.7	131.3	145.3	140.4
Miscellaneous Textile Goods	229	72.5	NA	NA	NA	NA	71.5	NA	NA	NA	NA	67.8

[1] Excludes knit fabric mills (Industries 2257 and 2258)

[2] Industries 2257 and 2258.

Source: Census of Manufactures, 1972 and 1977.

While employment trends among the groups generally followed similar patterns (i.e., increasing to 1973 and then decreasing), trends within the groups among the SIC industries often varied appreciably (Note: data within groups are not shown in the tables). In the weaving mills group, the cotton mills (SIC 2211) had an 80,000 employee reduction while the man-made fiber mills (SIC 2221) experienced a 40,000 increase during the period 1967-1972. In actuality, this represented a shifting of employment figures between the industries to accommodate the reclassification of plants to reflect the increasing trend towards man-made fiber products. The overall reduction in the employment level among the broad woven fabric mills (both SIC 2211 and SIC 2221) was about 40,000. The employment in the woolen fabric mills was cut in half during the period dropping from over 40,000 in 1967 to under 20,000 in 1972. Since 1977, employment level in the cotton mills has remained just short of 120,000 while that of the man-made fiber mills has fluctuated between 150,000 and 160,000.

As previously discussed, the overall upward trend in the knitting mills group reflected a significant increase in employment. However, this 50,000 worker increase was experienced in the knit fabric mills (warp and circular) industries only, with a jump from 36,000 in 1967 to 90,000 in 1972. All of the other knit groups (knit apparel-hosiery, outerwear, and underwear) declined, losing 20,000 employees. Since 1972 employment in the fabric mills has declined from 90,000 to just over 70,000.

In the dyeing and finishing group, plants that finished cotton fabrics lost 10,000 employees while plants finishing man-made fabric experienced a 10,000 increase July 1967-1972. As pointed out in the case of the weaving mills, the difference, in actuality, represents a shifting of employee figures associated with reclassification of mills because of the dramatic increase in the production of man-made fabrics. Since 1972, both type plants have seen reductions of around 2,000 employees in each of the two SIC industries.

In the yarn and thread mills group, all industries experienced increases with the exception of wool yarn mills. Employment within this industry dropped from over 11,000 in 1967 to 8,500 in 1972. Employment in those mills spinning cotton and man-made yarns increased close to 40 percent, rising from 93,000 in 1967 to 127,000 in 1972. Since 1972, this employment has dropped off.

In the floor covering mills group, employment in the tufting mills has shown a dramatic rise increasing from just over 30,000 in 1967 to over 50,000 in 1972. The employment level in woven carpet mills experienced a gradual decline of about 2,000 workers during the same period and had dropped another 2,000 by 1977. In 1977, the level in the tufted mills was 50,000 about the same as 1972.

In the miscellaneous textile goods group, slight decreases occurred in most of the industries during 1967-1972. However, in the nonwoven fabrics industry, the employment level doubled during the period increasing from about 5,000 in 1967 to over 10,000 in 1972. Since 1972, it has remained at about the same level.

As measured by the proportion of production workers to total employment within the industry, the textile industry is the most labor intensive group among the non-durable goods, as shown in the 1977 data below. The percentage of production workers in the textile industry exceeded 87 percent as opposed to about 72 percent for the composite of non-durable goods. Apparel was the next most intensive industry with close to 86 percent production workers.

Industry	Percentage of Production Workers (1977)
Total Non-durable	72.4
Food Processing	67.6
Tobacco	80.6
Textile	87.2
Apparel	85.7
Paper	75.1
Printing	57.6
Chemical	57.4
Petroleum	65.5
Rubber	78.4
Leather Tanning	85.5

Source: BLS Handbook of Labor Statistics.

Within the aggregate textile industry, the most labor intensive groups are the weaving mills and yarn and thread mills with percentages of production workers at 90 and 91 percent, respectively, as was shown in Table III-24. The least intensive are the floor covering mills and the miscellaneous textile goods industries, with 79 and 81 percent, respectively.

2. Industry Wage Levels

The average weekly hours of production workers in the textile industry are similar to the hours for all manufacturing industries, as shown in Table III-26. However, the average hourly earnings have been significantly lower. In 1977, textile employees averaged $3.97 per hour, which was $1.10 less than the average earnings in all nondurable industries. Between 1962 and 1977, the average earnings of textile industry workers was about 20 percent below the average wages for all nondurable industry employees. The least wage difference between textile workers and other manufacturing industry employees occurred in 1968. The relationship of the two rates are about the same now as it was in the early 1960's (78 percent).

Industry wage surveys have recently been conducted by the Bureau of Labor Statistics in the textile industry covering selected SIC industries. The following discussions are based on these surveys with each survey's results covered separately.

Table III-26. Average hourly earnings and weekly hours -- textile industry and all manufacturing

Period	Average weekly hours		Average hourly earnings		Wages of textile mills as a percent of total nondurable industries
	All manufacturing	Textile industry	Total nondurable industries	Textile industry	
	(hours)	(hours)	(dollars)	(dollars)	(percent)
1962	40.4	40.6	2.17	1.68	77
1963	40.5	40.6	2.22	1.71	78
1964	40.7	41.0	2.29	1.79	78
1965	40.2	41.8	2.36	1.87	79
1966	41.3	41.9	2.45	1.96	80
1967	40.6	40.9	2.57	2.06	80
1968	40.7	41.2	2.74	2.21	81
1969	40.6	40.8	2.91	2.34	80
1970	39.8	39.9	3.08	2.45	80
1971	39.9	40.6	3.26	2.57	79
1972	40.6	41.3	3.47	2.74	79
1973	40.7	40.9	3.68	2.95	80
1974	40.0	39.4	3.99	3.19	80
1975	39.4	39.1	4.35	3.39	78
1976	40.1	40.1	4.68	3.67	78
1977	40.3	40.4	5.07	3.97	78

Source: BLS Handbook of Labor Statistics

Survey Category	SIC	Date	BLS Publication
Textiles (Yarn and Weaving)	221, 222, 223, 228	1975	Bulletin 1948
Textile Dyeing and Finishing	226	1976	Bulletin 1967
Hoisery	2251, 2252	1976	Bulletin 1987

a. Textiles (May 1975) Survey

Straight-time average earnings were $3.08 per hour for yarn and weaving mills as reported in the May 1975 Survey. (Note: These earnings excluded overtime and consequently are not comparable with the earnings listed in Table III-26). As shown in Table III-27, the highest wages were paid in the Middle Atlantic states with an average hourly rate of $3.33. In the Southeast, where over 90 percent of the workers are located, wages averaged $3.07.

Wages were highest in the weaving mills, averaging $3.25, and lowest in the yarn mills, at $2.90 an hour. The difference was due in part to the higher skilled jobs in the weaving mills. Wages in mills employing 500 or more averaged $3.11 per hour which was about 3 percent higher than mills employing between 100 and 499; the survey excluded mills employing less than 100.

About one-sixth of the employees were in mills operating under labor-management contracts. The greatest union strength was in New England with about one-half of the employees covered by contract. The least concentration was in the South with about one-eighth of the work force under contract.

b. Textile Dyeing and Finishing (June 1976) Survey

The average wage of production workers in textile dyeing and finishing was $3.82 an hour according to this survey. The lowest rate was in the Southeast where two-thirds of the workers were employed; there the earnings were $3.66 an hour. The rate in New England was $3.97 and in the Middle Atlantic $4.45. One reason for the low average in the Southeast was the relatively high employment of women. Women make up over 30 percent of the textile workers in the Southeast with their wages amounting to about ten percent less than men. Another contributing factor was the effect of unionization. Workers covered by union contracts had wages close to 15 percent higher, nationwide, than those that were not covered by union contracts. In the Southeast less than 20 percent of the textile workers were covered by contracts. However, in the other regions as many as 90 percent of the work force was unionized.

c. Hosiery (July 1976) Survey

Production workers in all hosiery mills averaged hourly earnings of $3.02 in July 1976. The rate was lowest in the Southeast where 90 percent of the workers are employed; there the rate was $3.01 an hour. The rate was slightly higher, $3.13, in the Middle Atlantic.

Table III-27. Production workers and average straight-time earnings - yarn and weaving mills

Location	Total		Yarn Mills2/		Weaving Mills2/		Integrated2/	
	Workers	Earnings ($)	Workers	Earnings ($)	Workers	Earnings ($)	Workers	Earnings ($)
New England	7,201	3.17	3,150	3.14	---	---	2,887	3.20
Maine and New Hampshire	2,150	3.03						
Southern New England	5,051	3.24						
Middle Atlantic	6,786	3.33	2,805	2.95	3,981	3.60	---	---
Southeast	267,967	3.07	79,876	2.89	23,232	3.19	164,839	3.14
Georgia	41,660	3.08						
North Carolina	102,959	3.01						
South Carolina	79,389	3.12						
Virginia	13,300	3.16						
Southwest	4,508	3.02	---	---	---	---	---	---
United States	288,462	3.08	88,079	2.90	28,607	3.25	171,776	3.14

1/ Include SIC Industries 2211, 2221, 2281, 2282, 2284
2/ Published data are not available for individual states by type mills.

Source: Bureau of Labor Statistics

Because the surveys discussed above were conducted at different times, comparison between the wages in the various groups is not feasible. However, the 1977 Census provides sufficient data to illustrate the wage differentials between the various type mills. The average hourly earnings of production workers for 1977 are listed in Table III-28.

The highest rates were generally earned in the less labor intensive industries in the miscellaneous group. Among the other groups, the highest rates were found in the finishing plants with an average rate of $4.47 and $4.61 in the cotton and man-made fiber finishing plants respectively. Other high rates were found in the man-made fiber weaving mills ($4.24), and the woven carpet and rugs ($4.27) industries. The lowest rates occurred in the labor intensive hosiery industry with $3.40 an hour and the knitting mills N.E.C. industry with $3.17 an hour.

Table III-28. Average hourly earnings of production workers -- Textile industry--1977

SIC	Industry	Average Hourly Earnings
	Weaving Mills	
2211	Weaving mills, cotton	4.20
2221	Weaving mills, man-made fiber	4.24
2231	Weaving and finishing mills, wool	4.08
2241	Narrow fabric mills	3.67
	Knitting Mills	
2251	Womens, hosiery	3.55
2252	Hosiery, n.e.c.	3.40
2253	Knit outerwear mills	3.70
2254	Knit underwear mills	3.55
2257	Circular knit fabric mills	4.20
2258	Warp knit fabric mills	4.05
2259	Knitting mills, n.e.c.	3.17
	Dyeing and finishing	
2261	Finishing plants, cotton	4.53
2262	Finishing plants, man-made fiber	4.60
2269	Finishing plants, n.e.c.	4.08
	Floor Covering mills	
2271	Woven carpets and rugs	4.27
2272	Tufted carpets and rugs	4.14
2279	Carpets and rugs, n.e.c	4.12
	Yarn and thread mills	
2281	Yarn mills, except wool	3.85
2282	Throwing and winding mills	3.85
2283	Wool yarn mills	3.71
2284	Thread mills	3.84
	Miscellaneous Textile Goods	
2291	Felt goods	4.92
2292	Lace goods	3.90
2293	Paddings and upholstery filling	4.34
2294	Processed textile waste	3.66
2295	Coated fabrics	5.59
2296	Tire cord and fabric	4.81
2297	Nonwoven fabrics	4.74
2298	Cordage and twine	3.78
2299	Textile goods, n.e.c.	(NA)

Source: Census of Manufactures, 1977.

IV. INDUSTRY PROFILE

The general production, marketing and financial characteristics of the textile industry have remained fairly stable, although individual establishments have experienced changes due to economic fluctuations, product popularity, technological improvements, and increased textile imports. Increasing incorporation and efficiency through integration have typically widened the sales and profit gap between small and large firms.

A. Production Profile

Total U.S. mill fiber consumption, an indicator of production, has increased during the last fifteen years, although the predominant types of fibers have changed from wool and cotton to man-made. While production of broad woven fabrics has declined, its loss has been offset by significant increases in the production of knit goods and carpets and rugs. Capacity has increased at about the same rate as production, a result of increased efficiency in looms and a significant increase in the number of double knit machines put into operation.

Production, capacity, and utilization closely parallel the general economy. In order to profit from rises and protect against recessions, the textile industry has increasingly consolidated, integrated and diversified within plants and among operations within multi-unit firms.

1. Production

Domestic production of the textile industry, represented by total fiber consumption, has increased at an average annual rate of about 3.3 percent during the last fifteen years (Table IV-1). However, in the past two years, it has stabilized at an average rate of about 2 percent. While total production has been relatively stable, there has been a dramatic change in the type of fiber consumed. Less than one-third of the wool is now being consumed than in the early 1960's, declining from over 450 million pounds in 1965, to about 130 million in 1979. Cotton consumption has declined also, although not as dramatically as wool, from over 4 billion pounds in 1965 to 3.0 billion in 1979. Consumption of man-made fiber has nearly tripled during the same period, increasing from about 3.6 billion pounds to about 9.5 billion.

As measured by the Federal Reserve Board industrial production index (Table IV-2), production in the textile industry has increased at an annual rate of about 3.3 percent as compared to a 3.7 percent increase for total industrial production. The most significant increase occurred between 1971 and 1972 for the textile industry when a 14 percent increase occurred. The high levels of production occurred during 1976 and 1979 with indexes of over 140.0 (1967=100). Between 1973 and 1975, the production index declined by nearly

Table IV-1. Fiber consumption--textile industry
(million pounds and percent)

Year	Man-made fiber & silk		Cotton		Wool		Total	
	(million pounds)	(%)	(million pounds)	(%)	(million pounds)	(%)	(million pounds)	(%)
1965	3,620.4	42.5	4,452.6	52.2	457.0	5.3	8,530.0	100
1966	3,994.7	44.2	4,621.0	51.1	427.9	4.7	9,043.6	100
1967	4,248.1	47.0	4,414.2	48.9	366.6	4.1	9,028.9	100
1968	5,309.5	54.2	4,104.1	41.9	378.4	3.9	9,792.0	100
1969	5,555.4	56.2	3,972.6	40.2	354.9	3.6	9,882.9	100
1970	5,502.7	57.6	3,773.6	39.5	273.3	2.9	9,549.6	100
1971	6,530.9	60.9	3,965.1	37.0	219.3	2.1	10,715.3	100
1972	7,567.8	64.9	3,849.8	33.0	246.9	2.1	11,664.5	100
1973	8,667.0	69.3	3,643.3	29.2	182.1	1.5	12,492.4	100
1974	7,700.6	69.2	3,306.1	29.7	116.5	1.1	11,123.2	100
1975	7,417.5	69.9	3,068.7	28.9	132.0	1.2	10,618.2	100
1976	8,055.3	69.5	3,389.0	29.2	145.9	1.3	11,590.2	100
1977	8,889.1	72.9	3,169.8	26.0	133.9	1.1	12,192.8	100
1978	9,229.7	74.4	3,040.4	24.5	141.6	1.1	12,411.7	100
1979	9,466.4	74.7	3,066.4	24.2	134.5	1.1	12,667.3	100

Source: Textile Organon, March 1979, 1980

Table IV-2. Index of industrial production - textile industry (1967 = 100)

Year	Total industrial production	Textile mill products	Cotton fabrics	Man-made fabrics	Wool fabrics	Knit goods	Fabric finishing	Carpeting	Yarn and misc.	Apparel products
1968	106.3	107.9	94.1	127.3	97.1	109.9	NA	119.3	NA	NA
1969	111.1	112.6	90.1	137.0	81.7	123.2	NA	130.0	NA	NA
1970	107.8	111.8	87.5	125.6	66.3	128.6	105.3	139.5	116.0	101.4
1971	109.6	116.5	90.8	118.9	47.6	135.3	110.0	149.1	130.3	104.7
1972	119.7	132.7	88.7	138.9	43.3	173.6	123.6	180.5	140.2	109.4
1973	129.8	142.9	83.5	167.8	56.0	194.0	135.4	194.3	145.4	117.3
1974	129.3	132.8	76.6	158.4	44.8	183.5	130.5	179.9	129.1	114.3
1975	117.8	122.3	70.7	141.0	44.8	175.0	119.5	157.7	116.8	107.6
1976*	130.5	134.6	80.8	161.1	41.9	185.3	133.2	166.4	133.6	125.7
1977*	138.2	134.4	76.5	163.3	49.6	186.3	132.1	181.6	128.6	134.2
1978*	146.1	137.5	73.4	172.1	57.3	183.4	150.3	184.1	134.7	134.2
1979*	152.2	143.8	74.9	186.7	55.4	190.1	148.8	209.1	140.6	130.7

Source: U.S. Federal Reserve Board, quoted in Textile Hi-lights.

* Revised; not strictly comparable with pre-1975 figures.

14 percent with the index dropping to 122.3 in 1975 to reflect the recession of that year. In 1979, the index increased to a high of 143.8.

As also shown in Table IV-2, the greatest increases in production have occurred in the manufacture of carpets where output has more than doubled since 1967. High increases have also occurred in the production of man-made fabrics and knit goods with 1979 indexes reaching 186.7 and 190.1 percent, respectively. The greatest decreases have occurred in cotton and wool fabrics with 1979 indexes of 74.9 and 55.4 percent, respectively.

Total production of broad woven goods measured in linear yards of material has been decreasing at an annual rate of 1.4 percent since 1967. Production declined from 13 billion yards in 1967 to 9 billion in 1975; it has remained at just under 11 billion since that time. The production of cotton goods has decreased from over 8 billion yards in 1967 to under 4 billion in 1979. Since 1967 the production of woolen goods has been cut in half dropping from 0.2 billion to 0.1 billion yards. Man-made fabrics have increased from 4.3 billion yards in 1967 to over 6.5 billion yards in 1979 (Table IV-3).

Because of a change in the reporting and classification systems by the Department of Commerce, it is not possible to construct a meaningful profile of knit fabric production between the 1960's and mid-70's. Prior to the fourth quarter 1973, data was collected on shipments which involved knit cloth physically shipped, including interplant transfers. Current data include not only shipments but also "captive" production which represents the knit fabric produced in a plant that will be used for the manufacture of knit goods and apparel in the same plant. For the period since 1973, the knitting mills segment's production data are depicted in Table IV-4. The impact of the change is apparent in the comparison of 1973 shipment data with 1973 production data which shows that the production is approximately twice as great as the shipments. Between 1969 and 1973, total shipments increased from 800 million pounds to about 1.2 billion pounds. Since 1973, as reflected in production data, the output has declined slightly, decreasing from over 2 billion pounds in 1973 to 1.7 billion in 1978.

The production of carpets and rugs has more than doubled since 1967, increasing from about 500 million square yards to over 1.2 billion in 1979 (Table IV-5). The manufacture of tufted carpets has doubled, increasing from about 400 million square yards in 1967 to over 1 billion in 1979. Woven carpets, which represent a minor portion of the total carpet production, incurred a significant decline with a 40 percent reduction between 1967 and 1979. Production of other carpets which include mats and other specialty items reflected only a slight increase during the same period. These latter types of carpets and rugs constituted only a very minor portion of the carpet industry--approximately 2.3 percent of the 1979 total carpet and rug production.

Table IV-3. Broad woven goods and fabric production (in millions of linear yards) 1/

Goods and fabrics	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Cotton goods	8,278	7,477	6,965	6,246	6,148	5,614	5,086	4,714	4,107	4,719	4,353	3,986	3,932
Man-made fiber fabrics	4,269	5,204	5,395	5,028	4,886	5,551	6,109	5,923	5,291	6,117	6,272	6,654	6,575
Woolen and worsted goods	239	243	222	179	113	103	106	81	77	87	92	105	119
Total broad woven goods	12,786	12,924	12,582	11,453	11,147	11,268	11,301	10,718	9,475	10,923	10,717	10,745	10,626

1/ Data on Broadwoven Fabrics Finished available in Bureau of Census, Current Industrial Reports, MA-22S, and MQ-22T (1975-1979 data).

Source: Standard & Poor's Industry Surveys-Textiles, 1979.

Table IV-4. Knit fabric shipments and production (in millions of pounds)

Type fabric	Shipments					Production					
	1969	1970	1971	1972	1973	1973	1974	1975	1976	1977	1978
Warp	294.0	322.8	364.8	340.0	345.5	427.0	425.2	427.7	387.3	399.6	394.7
Circular	510.9	527.7	624.1	793.9	819.4	--	--	--	--	--	--
Weft	--	--	--	--	--	1,503.0	1,465.2	1,419.9	1,339.6	1,315.8	1,255.7
TOTAL	804.9	850.5	988.8	1,134.0	1,165.0	2,070.8	2,011.3	1,960.4	1,828.2	1,715.4	1,720.51/

1/ Excludes knit garment length.

Source: Bureau of the Census, Current Industrial Reports, MQ-22K and MA-22K.

Table IV-5. Rugs and carpet production (million square yards)

Type of carpet	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Woven	35.7	35.8	35.7	29.7	26.1	26.7	24.6	23.2	19.0	18.1	16.0	18.9	21.3
Tufted	432.2	511.0	562.7	604.0	680.9	856.9	994.3	866.0	783.7	890.3	1,025.8	1,110.0	1,167.5
Other	28.9	39.3	44.8	46.8	40.0	59.3	56.4	49.9	31.4	3.10	32.2	33.3	27.5
Total	496.8	586.2	643.2	680.5	750.6	943.0	1,075.4	939.1	834.0	939.3	1,074.1	1,162.3	1,216.4

Source: Bureau of the Census, Current Industrial Reports, MQ-22Q

2. Capacity and Utilization

Since 1967, total capacity in the textile industry has increased at an average annual rate of 2.7 percent (Table IV-6). Capacity is broadly defined as the greatest level of output an industrial plant can achieve within a normal work pattern. It reflects both the number of machines in place and the modernization of the industry. The increase has primarily involved specific growth products such as denim and certain knit fabrics. Capacity peaked at an index of 158.1 (58 percent above 1967 production) in 1974. This reflected an increasing efficiency in looms weaving man-made fabrics and a dramatic increase in double knit machines put into operation between 1967-1973. The abrupt drop in the capacity level between 1974 and 1975 was due to the closing of over 200 knitting mills as a result of the 1974-1975 recession. In the future, modernization in the industry, with the use of more high-speed equipment, is expected to maintain capacity at adequate levels to meet demand; however, no significant increases are anticipated in the near future similar to those which occurred prior to 1974.

During 1967-1979 period, the average rate of capacity utilization (shown in Table IV-6) for the textile industry was 86.1 percent, slightly less than that recorded for the total nondurable manufacturing sector. Peak utilization rates for the industry occurred during the years of 1968 and 1973 and reflect the business cycles of those years. Troughs occurred during 1970 and 1975 with the business recessions. The low rate of 73.8 percent for 1975 was the lowest rate for the entire ten year period. Quarterly data (not shown in the table) published by the Federal Reserve Board show a difference in the peak and trough utilization rate of all nondurable manufacturing to be 23.8 percentage points for the period 1967-1976 with rates varying from 93.9 percent to 69.9 percent. The variance in the textile industry was somewhat higher with the extreme rates being at 93.9 percent and 60.1 percent for a total variance of over 33 percentage points.

Utilization rates also vary considerably between the differently sized companies. Based on data in the Federal Reserve Bulletin covering the period 1965-1973, large companies in nondurable goods manufacturing (with assets $100 million and over) averaged utilization rates of about 9 percentage points higher than the small companies with assets under $10 million. Although no specific data are available for the textile industry, it is expected that the differences in utilization rates would be about the same.

The fourth quarter utilization rates for the individual SIC industry groups are shown in Table IV-7 for the period 1974-1977. The highest rates for all groups except the woolen mills occurred during the fourth quarter of 1977. Both the cotton and man-made weaving mills reported exceptionally high rates, 98 and 90 percent respectively. These rates reflect the high rates attained in the greige mill which in many cases operated in excess of their capacities. The lowest rates occurred during the fourth quarter of 1974. During that quarter, the weaving and knitting mills had rates of only about 80 percent. The narrow fabric and floor covering mills had the lowest rates at just slightly more than 60 percent. Throughout the period the floor covering mills had the lowest rates which varied between 62 and 74 percent.

Table IV-6. Output, capacity, and utilization -- textile industry

Year	(Production) Output (1967=100)	Capacity (percent of 1967 output)	Utilization rate (percent)	Excess capacity (percent)
1967	100.0	109.9	91.0	9.0
1968	107.9	116.9	92.3	7.7
1969	112.6	123.5	91.2	8.8
1970	111.8	130.0	86.0	14.0
1971	116.5	134.7	86.5	13.5
1972	132.7	147.6	89.9	10.1
1973	142.9	153.3	93.2	6.8
1974	132.8	158.1	84.0	16.0
1975	104.3	141.3	73.8	26.2
1976	114.5	139.4	82.1	17.9
1977	113.3	142.2	79.7	20.3
1978	117.3	144.4	81.2	18.8
1979	121.3	137.5	88.2	11.8

Source: Federal Reserve Bulletin, March 1980.

Table IV-7. Utilization rates: fourth quarter, 1974-1975

SIC Industry Group	1974	1975	1976	1977
Weaving mills, cotton	82	89	82	98
Weaving mills, man-made	78	89	87	90
Weaving and finishing mills, wool	74	78	79	70
Narrow fabric mills	61	67	82	83
Knitting mills	80	83	77	81
Textile finishing, except wool	74	84	73	78
Floor covering mills	62	71	73	74
Yarn and thread mills	69	84	82	84
Miscellaneous textile goods	68	72	71	69

Source: U.S. Department of Commerce, Survey of Plant Capacity, 1975 Supplement, MQ-C1(75)-2, and Survey of Plant Capacity, 1977.

Loom activity is frequently considered a good measure of productivity in the industry and generally reflects changes in utilization rates. Table IV-8 lists the average hours looms operated for the cotton weaving mills. The greatest activity is shown for the years 1972, 1973 and 1979, corresponding with the high utilization rates recorded for those years. The least activity occurred during the 1975 recession. The operation of spindles is also a good measure of productivity. As shown in Table IV-9 peaks in activity occurred during 1968 and 1973, again corresponding closely to peaks in the utilization rates.

3. Importance of Integrated Facilities

Increasing concentration and greater industrial efficiency in the textile industry has been accompanied by a trend of increasing integration, both within plants and among operations within multi-unit firms. Many large plants combine all of the stages of processing from raw fiber to finished fabric (and apparel) and often include a variety of textile products. The degree of integration is illustrated in the findings of a survey conducted by the Treasury Department (as shown in Table IV-10).

Table IV-10 shows a number of plausible configurations of industry activities within plants representing both horizontal and vertical integration. For each of the major activities' categories, possibilities in vertical integration include:

- Yarn preparation -- greige milling + dyeing and finishing
- Weaving -- yarn preparation + greige milling + dyeing and finishing + cut and sew
- Knitting -- yarn preparation + greige milling + dyeing and finishing + cut and sew
- Carpet milling -- yarn preparation + greige milling + dyeing and finishing

In horizontal integration, feasible configurations include milling operations in weaving, knitting and carpet milling.

The highest level of integration is apparent in carpet and rug manufacturing. In those plants fabricating carpets, over 50 percent were involved in dyeing and finishing and about 20 percent were producing yarn. The next highest level of integration occurred in weaving. Over 50 percent of these mills were producing yarn and between 15 and 20 percent were dyeing and finishing. In the knitting mills, about a third of the plants were dyeing and finishing and over 10 percent were spinning yarn. About twice as many of the knitting mills were involved in cut and sew operations as were weaving mills.

Table IV-8. Loom hours operated - cotton broad woven goods (average hours per loom per week)

Period	Monthly average
1967	125.7
1968	124.4
1969	126.5
1970	125.4
1971	126.6
1972	128.5
1973	128.0
1974	120.9
1975	111.3
1976	125.0
1977	123.3
1978	125.2
1979	129.6

Source: American Textile Manufacturers Institute, Textile Hi-lights

Table IV-9. Cotton system spindle activity

Period	Cotton system spindles						Spindle hours operated		Index of cotton system activity (132 hour week)
	Spindles (in thousands)		Hours operated per active spindles	Percent active					
	In place	Active		On 100% cotton	On 100% man-made	On other fibers & blends	Total	Weekly average	
							--(in millions)--		
1967	20,605	20,041	6,341	75.0	--	25.0	126 239	2,430	90.0
1968	20,513	19,996	6,352	67.6	9.3	25.5	128,004	2,466	91.0
1969	20,113	19,562	6,341	64.8	10.5	24.8	125,597	2,178	88.6
1970	19,559	18,599	5,904	62.6	10.7	26.7	113,019	2,178	83.1
1971	19,215	18,424	6,148	62.1	10.5	27.4	113,780	2,189	84.3
1972	19,089	18,301	6,334	59.0	12.1	28.9	115,818	2,225	88.2
1973	18,890	18,036	6,393	55.1	13.4	31.5	116,010	2,234	89.1
1974	18,606	17,255	5,927	52.2	13.7	34.1	106,277	2,082	82.2
1975	18,178	17,138	5,500	49.6	13.0	37.2	93,275	1,763	73.0
1976	17,879	16,747	6,259	45.4	12.9	41.7	105,577	2,033	85.4
1977	17,668	16,649	6,197	41.9	13.9	44.2	99,635	1,994	85.1
1978	17,547	16,414	6,239	39.1	13.8	47.1	102,584	1,972	84.8
1979	17,305	16,249	6,235	39.2	14.1	46.6	101,943	1,958	85.3

Source: American Textile Manufacturers Institute, Textile Hi-Lights.

Table IV-10. The degree of integration of selected categories (SIC Industries) within the same plant (percent of observations where each category was located in the same plant with other selected categories)

Categories Ranked by Level of Integration with Other Categories in the Same Plant										
SCD	Percent	Cordage	Carpets	Weaving	Dyeing and Finishing	Knitting	Nonwoven	Yarn Prep.	Cut and Sew	Percent of Observations Where Only One Activity is Located in a Plant
	(percent)									
Cordage	100	X	0	46.7	20.0	0	6.6	20.0	6.6	0
Carpets	87.7	0	X	5.3	50.9	5.3	5.3	17.5	3.5	12.3
Weaving	83.6	2.7	1.2	X	16.4	3.5	0.8	54.7	4.3	16.4
Dyeing & Finishing	77.4	1.2	11.9	17.3	X	14.0	2.5	21.8	8.6	22.6
Knitting	75.7	0	2.9	8.7	32.0	X	0	13.6	7.8	24.3
Nonwoven	72.7	4.5	13.6	9.1	27.3	0	X	9.1	4.5	27.3
Yarn Prep	72.1	0.1	3.1	43.3	16.4	4.3	0.1	X	13.6	27.9
Cut & Sew	68.4	1.3	2.5	13.9	26.6	10.1	1.3	12.6	X	31.6

Source: Department of the Treasury, The Textile Industry, 1976.

Since Table IV-10 focuses on types of activities as opposed to types of mills, the extent of integration involving the dyeing and finishing plants and the yarn mills is not clearly delineated. However an examination of production data contained in the 1972 Census provides some insight into the integration within these groups. Of the total production of yarn (cotton and man-made) spun in SIC Industry 2281 (yarn mills), about 50 percent was finished in the mills spinning the yarn while the remainder was shipped to plants in the SIC Industry Group 226 for finishing. Although this does not reveal the number of plants involved, it does point out that about half of the yarn spun (by spinning mills) is produced in mills in which greige milling and finishing is being accomplished as integrated processes.

According to the 1977 Census, 8.5 billion linear yards of broadwoven fabric (excluding sheets and towels) were finished in the weaving mills (SIC 221 and 222) and in the finishing plants (SIC 226). About 60 percent of this was finished in commission mills, 24 percent in finishing plants other than commission mills, and 16 percent in weaving mills (integrated). The greatest portion of the fabric finished in the weaving mills was produced by between 60-74 of the largest mills in the industry or about 10 percent of the total number of weaving mills. This corresponds roughly with the 16.4 percent contained in Table IV-10 to indicate the approximate number of weaving mills which perform finishing as a part of their integrated operations.

Since knit fabric finishing can be accomplished without mercerization or desizing, integration of greige milling and finishing is much greater in this segment. However, the Census data do not facilitate an accurate comparison of how much fabric is finished in integrated facilities as opposed to separate facilities. According to the data, over 70 percent of the knitting mills were classified as producing finished fabric. However, the statistics do not reveal how many of these mills were engaged in finishing only. The Department of Commerce's Current Industrial Report (MQ-22K) indicates a total of 1.8 billion pounds of knit fabric was produced in 1976. Of this amount, 1.1 billion pounds, or 61 percent were shipped to other plants for finishing, leaving 39 percent to be finished in the knitting mills. This, again, corresponds roughly with the 31 percent integration shown in Table IV-10.

As shown previously in Table IV-10, over half of the weaving mills were involved in yarn preparation. However, on a production basis, the greatest portion of yarn consumed in the weaving process was produced within the weaving mills. The 1977 Census data show that over 4.6 billion pounds of fiber (raw cotton and staple and tow) were purchased directly by the weaving mills, and only about 856 million pounds of yarn were purchased.

4. Level of Diversification

The textile industry is not generally diversified at the mill level. Most plants specialize in one process; while types of fabric and fiber may differ, the general processes are similar. If the firm manufactures a variety of products, they are often handled in separate plants. Many large textile companies are multi-plant firms and do not depend on one type of fabric to carry the company. The Value Line mentioned one large but specialized company which manufactures mainly bottomweight fabrics, such as denim and canvas. Its narrow product line makes this company especially vulnerable to changes in style. Most of the larger textile companies guard against this risk by handling a diverse number of products. For example, two major companies manufacture furniture while others also produce foods and plastics. Following is a sampling of some large textile firms and their products:

Belding-Heminway	home sewing products, thread, zippers, buttons and engineering plastics
Burlington Industries	hosiery, sheets, pillowcases, drapes, and furniture
Chelsea Industries	narrow fabrics, dairy protein derivatives, shoe products and plastics
Collins & Aikman	woven, knitted and tufted fabric, and wallpaper
Ludlow Corporation	floor mats, carpet cushions, furniture, packaging materials, and printing papers for graphic arts industry
Mohasco Corporation	carpets and rugs, one of five largest furniture companies in the U.S., and furniture rental
Spring Mills	woven fabrics for apparel, home furnishings and packaged frozen foods

Source: The Value Line

Some of the diversification is a result of company mergers, while other firms add new products. Occasionally these additions are an extension of an established specialty, such as a primarily textile home furnishing industry manufacturing furniture or wallpaper. Other companies may manufacture seemingly unrelated items such as fabrics, foods, and shoe products. A 1977 report in Textile World stated that diversified textile firms recovered more quickly and strongly from the recession than did non-diversified companies 1/.

1/ "Survey Shows Diversified Firms Lead 1976 Industry Comeback," Textile World, June 1977, 24 and 27.

B. Market Profile

Domestic spending for textile products is estimated to be from 10 to 13 percent of disposable income. With a projected disposable income of $1,780 billion in 1980, the spending can be expected to approach $180 billion. Textile shipments were about $47 billion in 1979, which amounted to a fourth of the final textile market.

1. Market Analysis

The U.S. Department of Commerce utilizes a large-scale econometric model of the U.S. economy to provide information on the probable magnitude of the long term growth in real GNP and its major components. The model relies on input-output analysis to generate industry projections which in turn provide a basis for market analyses of most of the SIC industries. However, in the case of the textile industry, these projections have not been published primarily because of the volatility of exogenous factors such as exports and imports. Probably some of the best sources for market projections are the fiber producing firms, such as Celanese and Eastman, which supply the basic input to the textile industry. Other sources include consulting firms which have had a long time involvement with the industry. The projections accomplished by these sources are proprietary but often become available through trade publications such as the Daily News Record and Textile Industries. From these publications, a fairly consistent picture of the market outlook has emerged with most of the sources projecting a long term growth of the total industry (in terms of fiber consumed) of between 1.5 and 2.5 percent compounded annually. Celanese projects an annual increase of 2.5 percent through 1990 while Eastman indicates a growth of slightly over 2 percent through 1983. International Research Associates provided a more pessimistic outlook by estimating an annual increase of only 1.3 percent through 1988.

The largest textile market is apparel which accounts for about 40 percent of all fiber consumed in the industry. Although this market is the largest, its relative share of the total market has been decreasing over the past few years and its growth is expected to be the lowest when compared with the other major markets. This market can be expected to fluctuate widely; however a small gain can be anticipated because of the increasing number of consumers falling into the 25-39 year old group which generally have the largest purchases in apparel. New types of fabric with attractive surface designs should stimulate the demand in this group. Celanese projects an annual increase in this market of 2 percent through 1990. However, because of the anticipated encroachments by apparel imports, domestic shipments of fabric to the apparel industry is expected to increase at a low annual rate of 1.5 percent.

The second largest textile market comprises home furnishings which includes carpeting, draperies, upholstery, sheets and towels. In this market, carpeting is the only area in which any significant growth has occurred during the past decade. According to the Carpet and Rug Institute, tufting is projected to increase at an annual rate of 3.2 percent through 1983. Estimates from Eastman agree with this with their projection falling between 3 and 4 percent. In the other home furnishings, the overall upgrading of product quality has caused a decline in the volume of sales because of higher prices and increases in product life. For these products (excluding carpeting), Celanese projects an increase compounded annually of 2.0 percent for the next 10 years.

The industrial market ranks third in the amount of fiber consumed with 23 percent of the market. This market includes fabrics used in the manufacturing processes (conveyor belts) and those in which fabric appears as a component (auto upholstery). Increases in the industrial markets can be expected to follow GNP growth which is projected at about 3 percent over the next five years by the Department of Commerce. Celanese projects an annual increase of 2.7 percent over the next decade in this market. This increase will reflect a greater concentration in electronics, the computer field, communication systems, and filtration fabrics to be used in air pollution control.

Currently, exports in textile products amount to about 4 percent of the total textile market. Growth in this area will be covered in a subsequent section.

In addition to projections of market growth, projections have also been made of the growth of fiber consumption by type. Over the long term, increases in the supply of man-made fiber can be expected while decreases in cotton should occur even with the growing costs of feedstock for man-mades caused by rising oil prices.

Greatest increases can be expected in the polyester field. Celanese projects an annual growth of 5 percent for the staple and 4.5 percent for filament. International Research Associates' projections are slightly lower with the polyester staple increasing by 31 percent and filament by 3.4 percent. That firm projects the growth of nylon at a relatively low rate of 1.9 percent. Because of the decline in nylon fiber, the growth of all synthetic fibers was projected to increase at an annual rate of 2.8 percent. Consumption of cotton was projected to decrease at a rate of 3.5 percent annually.

Although considerable projections have been made available in connection with fiber consumption by type, not very many have been made of consumption by type fabrication system. Growth in consumption of the major system was projected by Eastman as shown in Exhibit IV-1. This exhibit indicates that the greatest growth can be expected in knitting with annual rate estimated at between 4 and 8 percent. The lowest growth is expected in weaving with an increase of under 1 percent expected. The projected increase of from 3 to 4 percent shown for tufting corresponds with the four year projection made by the Carpet and Rug Institute.

2. Domestic Market Description

In spite of a considerable trend towards integration of manufacturing activities, the textile industry continues to be characterized by a segreation of successive operations generally performed by separate firms. This is reflected by a series of intermediate markets and a separation of wholesale

Exhibit IV-1.

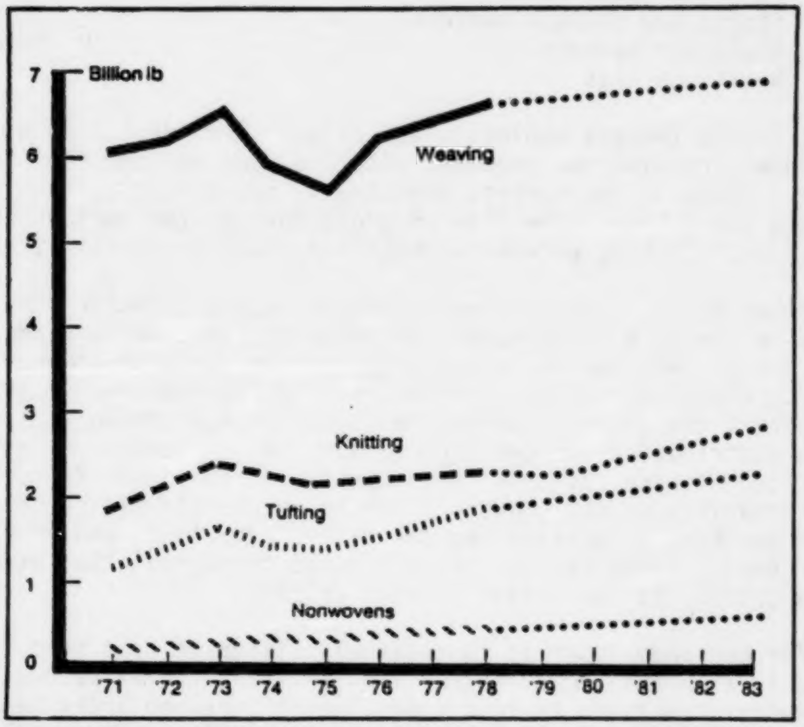

Figure 1. Fiber consumed in U.S. mills by fabrication system (source: Eastman)

and retail distribution. The structure persists even though integrated firms may transfer goods directly from one operation to another without recourse to the markets. The market channels lead through eight levels as listed below.

- (a) Raw fiber markets
- (b) Processed fiber markets
- (c) Yarn markets
- (d) Greige goods markets
- (e) Finished goods markets
- (f) Fabricated product markets
- (g) Wholesale markets
- (h) Retail markets

These market levels (except wholesale and retail) are identified with products which are closely related and produced with the same equipment or in the same type of mill. Although the markets are clearly identifiable, considerable overlap exists among them. The flow of goods through the various channels and the interrelationships between markets are shown in Exhibit IV-2.

In the raw fiber market, the trading of cotton is characterized by large fluctuations in yield, a large number of sellers, and a certain amount of government control over the marketing process. Only a small amount of raw material is purchased directly by the mills from the growers. Most of the cotton enters the grower's market in which the raw cotton is assembled for ultimate distribution through central markets. In these markets, the cotton is traded between the commission merchants, shippers, factors, and other representatives of the growers (such as co-operatives) on the one hand and the purchasers representing the mills, exporters, and other interests on the other hand. These central markets exist throughout the cotton belt; however, New Orleans is the leader in spot pricing.

The market for man-made fiber is considerably different from that for natural fibers since it is manufactured rather than an agricultural product. The basic difference in markets is that there are no intermediaries between the producers and mills, as in the case of cotton; therefore, the producers normally sell directly to the mills.

Processed fibers are those that have undergone processing beyond the raw fiber state but have not yet been spun into yarn. One of the chief products traded on this market is wool tops which are utilized in worsted mills.

Yarn production is generally integrated wherever possible with weaving, knitting and other manufacturing. However, a substantial amount is distributed through the yarn markets principally to the knitting mills, carpet mills, and small weaving mills. The relatively small size of the spinning mills has brought about a market organization in which selling is done through relatively few agents. The principal yarn markets are in the consuming areas. Yarn used in the knit apparel mills is usually sold through jobbers while the weaving yarns and yarns for the large knitting mills are sold directly by the spinner or his agent to the using mills.

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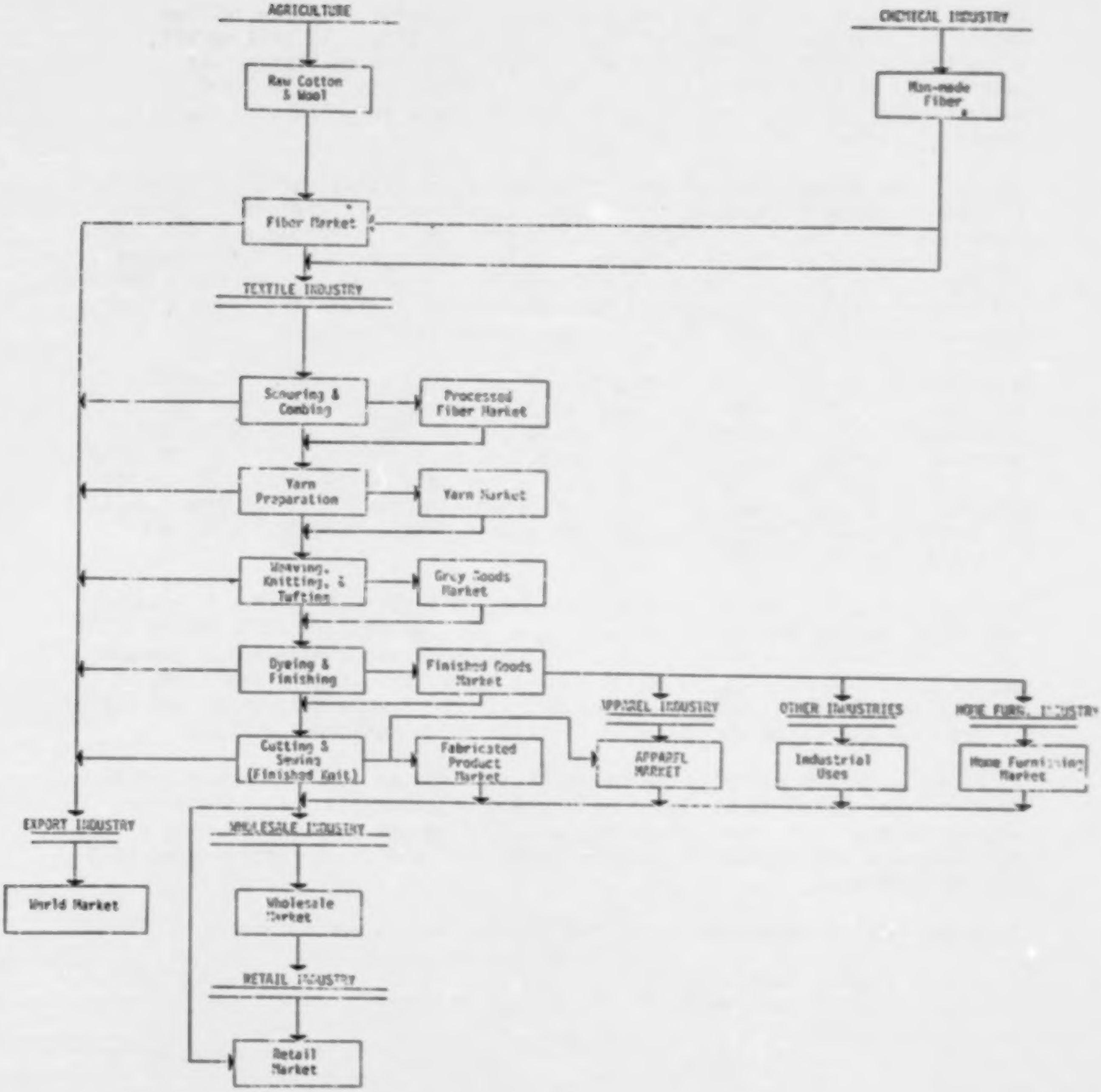
Exhibit IV-2. Textile marketing, flow of goods


AGRICULTURE
CHEMICAL INDUSTRY
Raw Cotton & Wool
Man-made Fiber
Fiber Market
TEXTILE INDUSTRY
Scouring & Combing
Processed Fiber Market
Yarn Preparation
Yarn Market
Weaving, Knitting, & Tufting
Grey Goods Market
Dyeing & Finishing
Finished Goods Market
APPAREL INDUSTRY
OTHER INDUSTRIES
HOME FURN. INDUSTRY
Cutting & Sewing (Finished Knit)
Fabricated Product Market
APPAREL MARKET
Industrial Uses
Home Furnishing Market
EXPORT INDUSTRY
World Market
WHOLESALE INDUSTRY
Wholesale Market
RETAIL INDUSTRY
Retail Market

Source: Development Planning and Research Associates, Manhattan, Kansas.

There are two distinct markets for selling thread: domestic and industrial. Industrial thread is sold similarly to yarn, by the pound, on cones ranging from 3,600 to 30,000 yards each. On the other hand, thread entering the domestic market is sold on small thread spools.

The greige fabric market is concentrated in the hands of a few selling agents and brokers with main offices in New York City. In this market, quotations are made on a bid and ask basis; there are no list prices. Selling may be on either a spot or future delivery basis with widely used standard constructions sold for spot delivery and cloths of special construction sold for future delivery.

The finished goods market differs from the greige fabric market principally by type of customer served. While the greige manufacturers deal with processors within the textile industry, the finished goods producers sell their products outside of the industry to "cut and sew" operators in the apparel industry. The apparel customers are greatly influenced by the retail markets and are usually under-financed. The combination of these two factors contributes to the instability in the finished goods market.

Some of the instability is offset by the method of merchandizing used in the market. In the market, "lines" of goods are prepared comprising an assortment of fabrics, colors, and designs which contain some materials intended to appeal to all of the manufacturers customers. Part of the line is a carry over from previous seasons and part are goods introduced to the markets for a single season. In this system, the manufacturers are reluctant to change prices during a "season" and consequently prices tend to remain stable during the period.

Finished goods are purchased both for spot and future deliveries. However, the volatility in the retail markets tends to make selling on a future basis unsatisfactory since the purchasers are unable to anticipate which garment patterns will be selling. Textile manufacturers are usually unwilling to enforce the "blanket" orders associated with the future deliveries because of the risk of losing the goodwill of their major customers.

Finished goods are normally sold from list prices as opposed to selling by "market" quotations as is the case in the greige markets. As pointed out above, these prices usually remain stable during the season, dropping off at the end of the period on closeout goods that cannot be carried over into the next season.

Types of fabricated products included in the textile industry are:

(a) sheets, towels and blankets
(b) knitted underwear, outerwear, and hosiery
(c) carpets

Sheets, towels and blankets are produced by weaving mills and require only a minimum of fabrication. Fabrication usually consists of a simple cutting operation and hemming or binding of the edges. The markets for these products are similar to those of finished goods.

Knit apparel (hosiery, underwear, and outerwear) are end products and enter directly from the mills into the wholesale and retail distribution systems.

Carpets and rugs enter the broad home furnishings markets through the wholesale and retail marketing system.

Within the textile industry, competition is keen at most of the market levels, not only between type of fibers used but also between fabrics. The dramatic trends in the last decade towards the use of man-made fibers points out clearly the inter-fiber competition in the textile markets. However, it is important to note that fibers compete with others for only a part of their uses. For example, cotton has very little competition in the manufacture of sheets and pillow cases. In contrast, competition between fibers is considerably greater in dress goods. Competition also exists between fabrics. This competition is reflected in the substitution of double knit fabrics for woven fabrics in the manufacture of suits.

3. International Trade

International trade has had a significant influence on the U.S. textile markets. The considerable growth in the level of imported textiles and apparel has not been offset by increases of exports of U.S. produced textile and apparel products. Also efforts by the U.S. industry to limit the future growth rates of imports have not been successful. While this section of this report will not attempt to analyze the pro's and con's of the trade situation, it will attempt to depict the trends in the levels of imports and exports as well as describe the basic trade agreements the U.S. currently has in effect.

a. Import market channels

The market channels for textile and related goods being imported to the U.S. are very similar to those associated with the domestically produced goods. Depending upon the level of manufacture of the imported good, the typical sequence of its entrance into the U.S. markets would begin with an import broker and, from this step, the good would funnel into the normal market channels described in the previous section. As long as the imported good was of comparable quality, once it entered the domestic market channels, very few distinguishable attributes would be associated with it unless, of course, it was priced differently.

b. Level of imports

After more than doubling in the 1960's, U.S. textile imports reached a value of $8.1 billion in 1979 (Table IV-11). The value of these imports amounted to over 4 percent of all merchandise imported to the U.S.

Table IV-11. U.S. textile trade
(millions of dollars)

Period	Imports	Exports	Deficit
1967	1,461	660	801
1968	1,818	694	1,124
1969	2,125	753	1,372
1970	2,402	776	1,626
1971	2,913	837	2,076
1972	3,411	993	2,418
1973	3,722	1,497	2,225
1974	3,952	2,168	1,784
1975	3,780	2,027	1,753
1976	5,269	2,480	2,789
1977	5,926	2,567	3,359
1978	7,857	2,903	4,954
1979	8,093	4,120	3,973

Source: American Textile Manufacturers Institute, Hi-Lights.

As measured by the raw fiber equivalent of semi-manufactured and manufactured textiles, imports doubled with total pounds climbing from 800 million to close to 1,600 million (Table IV-12). Imports dropped to 1,350 million pounds in 1979. Products of man-made fiber more than doubled during the period, jumping from about 200 million pounds to close to 530 million pounds. Imports of cotton products increased from 473 million pounds to 750 million, an increase of 60 percent. Imports of wool products dropped from 104 million pounds in 1968 to under 50 million in 1975 during the recession, then subsequently climbed back to about 80 million in 1979. Over a third of the total imports in 1979 consisted of semimanufactured products (yarn and fabric) with the remainder made up of apparel, industrial and home furnishings. This is a significant change from the composition ten years ago when semimanufactured products amounted to over 50 percent of the total textile imports.

The trend towards trading in apparel products is revealed in the growth rate of the various products (Table IV-13). Broad woven fabric imports, amounting to 5 percent of domestic production in 1967, rose to 8 percent by 1976. Knit fabric has remained under the one percent mark. In contrast, imports of sweaters rose from about 33 percent of U.S. production to over 100 percent during the same period. Imports of knit slacks showed even a greater growth by rising from 4 percent of production in 1967 to over 35 percent in 1976. Over half of the imports in 1976 (textile and apparel products) was shipped from the Far East: Hong Kong, Korea, Japan, and Taiwan. In the past several years, the share of imports among these countries has changed significantly. Korea's share has been increasing while that of Japan's has been decreasing.

While total textile imports amount to about 10 percent of the domestic textile products market, wool textile imports represent a substantially higher share of the wool products market. For the past ten years, wool imports have fluctuated between 20 and 25 percent of the market. The high occurred in 1968 with wool imports representing 25 percent of the market. The low occurred in 1975 with imports having less than 20 percent of the share. The level in 1976 was just over 23 percent.

In contrast to the growing textile imports discussed above, overall imports in rugs, carpets, and carpeting have not gained a significant share of the domestic markets, except in the case of wool carpets. The total imports in carpets (man-made, cotton, and wool) have shown a slight decline over the past ten years decreasing from about 3 percent of domestic production in 1967 to about one percent in 1976. However, wool carpet imports which have been accounting for about half of the total carpet imports in recent years have shown significant increases in the 1970's. In 1976, these imports were at a level of about 6 percent of the domestic production. With substantial yearly increases, imports reached 5.6 million square yards in 1976; this was close to two-thirds of total domestic production.

Table IV-12. Raw fiber equivalent of imports of manufactures (million pounds)

Year	Man-made	Cotton	Wool	Total
1968	193.3	473.8	104.3	771.4
1969	257.5	488.0	96.2	841.7
1970	329.3	463.1	85.9	878.3
1971	451.1	392.5	66.2	909.8
1972	480.5	610.7	63.0	1,154.2
1973	465.3	563.5	61.3	1,090.1
1974	371.3	502.7	53.3	927.3
1975	400.4	501.2	48.6	950.2
1976	479.5	708.6	66.7	1,254.8
1977	530.7	669.4	85.9	1,286.0
1978	642.6	845.4	92.2	1,580.2
1979	525.0	746.1	80.5	1,351.6

Source: Textile Organon

Table IV-13. Import/production ratios--selected textile and apparel products

	Broadwoven fabrics							Carpets	
	Cotton & man-made	Wool	Knit Fabric	Hosiery	Sweaters	Trousers Slacks Shorts	Underwear	All	Wool
	(Percent)								
1967	4.9	16.7	0.9	0.5	32.9	10.0	0.8	2.6	9.4
1968	4.9	21.6	0.8	0.6	52.1	12.7	1.3	3.3	6.4
1969	5.6	21.0	1.0	0.6	72.2	16.0	1.5	3.1	6.1
1970	5.9	20.5	2.1	3.3	71.0	17.2	2.0	2.5	5.9
1971	6.4	15.3	5.1	2.3	88.7	21.8	3.1	2.1	7.1
1972	7.6	11.7	2.8	1.6	77.3	22.6	2.6	1.8	10.3
1973	7.2	13.2	1.6	1.6	74.8	21.6	2.2	1.4	19.8
1974	7.0	10.7	0.7	2.1	79.0	17.1	1.8	1.1	34.6
1975	6.2	10.1	0.6	1.6	89.0	21.5	1.8	1.1	43.7
1976	8.4	12.5	0.6	1.3	108.1	23.9	1.8	1.3	63.4
1977	6.4	15.4	0.5	1.4	106.8	24.4	2.7	1.1	61.5
1978	8.7	15.0	0.5	1.6	118.0	31.0	2.9	1.0	64.0

Source: U.S. Department of Commerce, U.S. Imports: Ratios of Textiles/Apparel, 1977, 1980.

c. Level of U.S. exports

While imports in dollar volume have doubled during the early 1970's, textile exports have tripled, climbing close to $2.5 billion in 1976. However, since exports have been expanding from a much smaller base, a continuing deficit in textile trade exists. In 1976, the deficit reached $2.8 billion which represents 30 percent of the nation's $9.2 billion merchandise trade deficit. In exports of cotton and man-made textiles, shipments increased from just over 300 million pounds in 1968 to a record 1,088.9 million in 1979 (Table IV-14). For the past several years, exports in cotton and man-made textile and apparel products have remained at about 7 percent of domestic production. In wool products, exports rose to a high of 30.8 million pounds in 1973 -- about 13 percent of the domestic production level. These imports dropped to just over 11 million pounds in 1977 and 1978 and then climbed back up to 14.3 million pounds in 1979.

While apparel products accounted for the greatest portion of the imports, piece goods accounted for the largest share of the exports. In cotton, exports climbed from around 200 million pounds in the late 1960's to close to 500 million in 1979. During the same period, exports in man-made fiber goods increased from around 130 million pounds to nearly 600 million pounds.

d. Trade restrictions

In order to prevent disruption of developed countries' textile industries by low-wage competition from exporting nations, textile imports in most countries are regulated by a series of international trade agreements. Of major importance to these textile trade regulations is the Tokyo Round Trade Agreement of the Multilateral Trade Negotiations (MTN). This trade agreement was negotiated under the auspices of the General Agreement on Tariffs and Trade, or GATT. As in all GATT talks, the Tokyo Rounds were conducted on the principle that any favorable concession granted to one country will be extended to all GATT members. This treatment, referred to as the Most-Favored-Nation principle (MFN), is usually granted to include non-GATT countries also. The U.S. is the one exception to this principle for it will frequently not apply the MFN to countries or areas dominated by Communism. The U.S. acceptance of the Tokyo Round was signed into law in July 1979, by President Carter after almost six years of strenuous negotiations. It is intended to harmonize existing U.S. laws with new international codes primarily dealing with tariff levels and five non-tariff barriers to trade. These are discussed below.

One of the most controversial issues of the Tokyo Rounds involved the reduction of tariffs which a country levies against the price of foreign goods being imported. As a result of the Tokyo Rounds negotiations, tariffs on textile products are to be reduced by an average of 21 percent. The textile products tariff reductions will be numerous and vary by

Table IV-14. Raw fiber equivalent of export of manufacturers (million pounds)

Year	Man-made	Cotton	Wool	Total
1968	129.0	188.2	5.7	322.9
1969	146.2	232.1	5.2	383.5
1970	147.4	199.2	4.9	351.5
1971	146.7	226.3	9.4	382.4
1972	177.6	290.4	30.6	498.6
1973	288.2	325.2	30.8	644.2
1974	390.7	292.5	23.0	706.2
1975	322.4	353.7	19.2	695.3
1976	352.2	413.2	13.9	779.3
1977	367.6	369.5	11.5	748.1
1978	441.7	355.7	11.6	809.0
1979	596.6	478.0	14.3	1,088.9

Source: Textile Organon

product classification with approximately 3,500 different textile and apparel classifications considered in the negotiations. The current tariff rate, the proposed new rate, and the resulting reduction for selected textile products are depicted in Table IV-15. As shown in the table, proposed reductions range from relatively small decreases (5.9 percent for woven wool) to reductions of over one-half (60 percent for cotton furnishings). The projected economic ramifications of the industry's tariff reductions vary. According to William R. Cline, main investigator for the Brookings Institution's study on the effect of trade negotiations in the Tokyo Round, the major impact of the revised tariff levels will be on employment. Even so, Cline predicts only a 1.65 percent employment reduction in the industry, a level considered minimal. He also contends that some of the lost jobs will be regained by additional U.S. exports. Furthermore, initial tariff cuts will not take effect until 1982, with additional liberalization over a period of eight to ten years. The American Textiles Manufacturers Institute (ATMI) have an opposing view of the impact of tariff reductions, however. They assert that total U.S. job losses due to the economic effect of the reductions would decrease employment by 40 percent or 800,000 workers. The ATMI predicts that the smaller, family-owned manufacturers will be most severely affected, while the larger, multi-corporations can more readily absorb the changes.

In addition to tariff reductions to promote international trade, the Toyko Round also legislated a series of codes to help eliminate the five major non-tariff barriers to trade. One of the codes involves regulation of government subsidies for exports of manufactured goods. The new code attempts to expedite the time required to make official investigations and determinations in countervailing and dumping (flooding a market with specific imports) cases. The length of the investigations by the Treasury Department would be cut from six or nine months to 120 days. It would also reduce to 120 days the period of time the International Trade Commission (ITC) has to rule on whether or not the imported products were harming domestic industries. In addition, the Tokyo Round allows for the Treasury Department and ITC investigations to overlap, further reducing the time constraints. It also restricts the President to 30 days to act on ITC's suggestions instead of the 90 days allotted historically. Under previous trade agreements, the Treasury Department had a year to reach its final decision in countervailing duty cases; however, now the Department will have a total of 195 days to make its final decision. A major concession in the agreement provides that the U.S. cannot apply countervailing duties on subsidized products unless it can prove the domestic industry suffered injury as a result of the imports. The somewhat nebulous guidelines of determining injury requires the U.S. to prove "harm" which is not inconsequential, immaterial or unimportant" has taken place. The agreement also expands dumping duties to include the 3 months of imports before the preliminary dumping findings. Furthermore, a deposit of the estimated dumping duties will be required from the exporting country if injury is proved.

Table IV-15. Proposed tariff reductions on major textile products

Product	Current tariff	Proposed tariff	Reduction
	--------------	percent [2]	--------------
Wool yarns	13-23.4	9-15.0	30.77-35.90
Man-made fiber[1]/wool blends	18.2	15.0	17.6
Man-made[1] fabrics	24.5	17.0	30.6
Woven wool (over $9/lb)	44.4	33.0	25.7
Woven wool (less than $9/lb)	44.4	41.8	5.9
Cotton shirting	16.7	12.2	26.9
Cotton towels	14.0	10.5	25.0
Cotton corduroy	38.0	23.0	39.5
Cotton velveteen	22.5-30.0	16-20.0	28.9
Cotton terry	15.4	11.1	27.9
Cotton velveteen furnishings	30.0	12.0	60.0
Corduroy furnishings	38.0	15.2	60.0
Cotton terry furnishing	15.0	7.2	52.0

[1] Comprised of acetate, nylon, and/or polyester.

[2] Tariffs expressed as a percent of transaction value (first cost).

Source: Daily News Record, July 13, 1979

Another significant code aimed at reducing non-tariff barriers to trade bars the use of arbitrary product standards to discourage imports. In the past, countries when faced with a surplus of domestic goods, would raise the products' minimal requirements (e.g. health or technical) for imported goods while maintaining the original standards for domestic goods. The new code does not dictate what the standards must be, per se, but rather it calls for open procedures in adopting standards and sets up a review procedure for settling disputes.

A third code established in the trade agreement eliminates the numerous arbitrary methods that governments use to inflate the value of imports to calculate custom duties. As a result of the false value placed on the products, the goods are over-priced and not competitive with the domestic markets. Under the new code, countries that do not accept a manufacturer's invoice price must use an elaborate, carefully devised formula to establish a revised value.

The final two codes anticipated to have major impacts on breaking down trade barriers include regulating official purchasing practices and import licensing. The revised purchasing practices allow countries to bid on foreign government contracts. This results in not only a broader market for exporters, but it also makes the bidding more competitive and efficient. In the past, import licenses have been difficult, if not impossible, to obtain for certain domestic products. This provided the manufacturers some protection against lower-priced, imported goods. The establishment of this code ensures that licenses are available at a reasonable time after they are requested.

It is clear that while the Tokyo Round trade agreements will promote trade by reducing tariff levels and eliminating some of the major non-tariff barriers to trade, it will also have an adverse impact on the U.S. textile industry. Although the severity of the impact is argued by several special interest groups, the U.S. plans to strengthen existing legislation in order to assist the beleaguered industry. It is anticipated that the "Arrangement Regarding International Trade in Textiles," also referred to as the Multifiber Arrangement, will be one area of change. The Multifiber Arrangement (MFA) is an extension of the General Agreement on Tariffs and Trade. The MFA was originally negotiated by 50 major textile trading countries in December, 1973, with its four-year term expiring December 31, 1977. At that time, it was extended to December 31, 1981. The MFA regulates the importation of textile products manufactured from cotton, wool, man-made fibers, and all blends among the 50 countries.

The basic objectives of the MFA seek an expansion of trade, reduction of trade barriers, and progressive liberalization of world trade involving textile products. In addition, it ensures the orderly and equitable development of trade aimed at preventing a disruption of individual markets. Other goals of the MFA include enhancing the social development of developing countries, securing substantial increases in their export earnings from textile products, and providing the opportunity of a greater share in world trade.

Under the provisions of the MFA, the U.S. may restrain textile imports from particular countries by negotiating bilateral agreements with exporting countries or through unilateral actions. Currently, the U.S. has 18 bilaterals in force including agreements with all of the major exporting countries. These countries and the textile categories involved are presented in Table IV-16.

A significant feature of the MFA is that it calls for an annual six percent growth in the levels established by the bilaterals. Although the MFA provides the general framework for trade, specific restrictions are covered in the bilateral agreements. Under most of these bilaterals, aggregate limits are established for total imports (which may or may not conform with the six percent growth rate) and then quotas are set for each group of production to include textiles, apparel, and wool. Within these groups, specific import quotas are set for specific items. Quotas generally reflect the market sensitivity of the specific product. U.S. bilaterals have provided for an annual one percent growth in the import of wool products because of the small size of the wool industry and because of market problems in this industry. Restrictive quotas also have been negotiated on more sensitive apparel products such as gloves, sweaters, and knit shirts.

There are also features of the bilaterals which permit import levels to increase over the 6 percent annual level established in the MFA. One such feature allows unused quotas to carry over from one period to the next. For example, if one country had an import level of 36 thousand tons of wool per year, but in a given year only 30 thousand tons were actually imported, the next period's import level would still be a 6 percent increase over the 36 thousand tons originally allowed (38.2 thousand tons of wool) plus the unused 6 thousand tons would be allowed to accumulate for the next period resulting in a total import level of 44 thousand tons in the second year. The following period's level of importation would then be 6 percent of 44 thousand tons rather than 6 percent of 38 thousand tons. Several periods of compounding growth in this manner can have a severe impact on importing countries.

The U.S. textile industry has strongly urged that drastic changes be made in the Multifiber Arrangement. In the view of many, the MFA will lead to major disruptions of the textile and apparel industries and a resultant widespread reduction in employment. The view is also held that imports could grow to 50 percent of the textile markets by the late 1980's. To counter this, industry and labor are pressing for more restrictive regulations, those which would include a reduction of the six percent quota growth factor to come in line with the approximately three percent growth in the domestic market.

Table IV-16. The Textile Industry--countries with which the U.S. has bilateral agreements as allowed under the auspices of the Multifiber Arrangement

Country	Textile category involved
Arab Republic of Egypt	Cotton
Brazil	Cotton
Colombia	Cotton, wool and man-made fibers
Haiti	Cotton, man-made fibers
Hong Kong	Cotton, wool and man-made fibers
India	Cotton
Japan	Cotton, wool and man-made fibers
Korea	Cotton, wool and man-made fibers
Macao	Cotton, wool and man-made fibers
Malaysia	Cotton, wool and man-made fibers
Mexico	Cotton, wool and man-made fibers
Pakistan	Cotton
Philippines	Cotton, wool and man-made fibers
Poland	Cotton
Romania	Cotton, wool and man-made fibers 1/
Singapore	Cotton, wool and man-made fibers
Taiwan	Cotton, wool and man-made fibers
Thailand	Cotton, wool and man-made fibers

1/ This is the 2nd of 2 agreements negotiated by Romania.

Source: U.S. Dept. of Commerce

C. Financial Profile

Textile industry sales have increased at a rate of about seven percent annually over the last ten years. Domestic mills are facing a growing threat from foreign markets which now dominate about one-fourth of U.S. sales. Operating costs for the textile industry have remained steady over the last ten years, always slightly higher as a percent of sales than the average for all manufacturing industries. Depreciation levels are inadequate to permit the industry to keep abreast of its capital requirements since new machinery is two to four times as expensive as that being replaced. Long-term credit is scarce in the industry and firms must rely on internally generated funds. Deficits grew from 29 percent of the firms in the entire industry in 1972 to 43 percent in 1975; by 1977 they returned to 29 percent. Returns on sales, equity and assets continue to rank among the lowest compared to those of all other manufacturing industries.

1. General Trends in the Industry

While the quantities of textile products produced have grown at an average annual rate of 3.5 percent during the past ten years, the values of shipments of textile products have grown at an annual average rate twice the production growth rate, increasing from approximately $20 billion in 1967, to over $47 billion in 1979. The value of shipments for the textile industry during this period was approximately three percent of the total value of shipments from all manufacturing industries. However, the textile industry proportion declined during the ten year period from 3.3 percent in 1967 to 2.8 percent in 1976. Comparison of the textile industry with all manufacturing industries with respect to the share of sales and profits reveals that while the textile industry accounted for three percent of the sales of all manufacturing industries, it accounted for only 1.9 percent of the aggregate industries' profits in 1971, with the share decreasing to only one percent in 1975.

2. Sales

According to data published in the FTC Quarterly Financial Reports, corporate sales within the textile industry have been increasing at an average rate of about 7 percent annually, rising from $18.7 billion in 1967 to nearly 42 billion in 1979 (Table IV-17). This annual increase is somewhat less than that of the Census' value of shipments which indicates a trend towards greater integration within the industry. In 1970, noncorporate sales represented about two percent of the total industry volume, including those of proprietorships and partnerships. However, in recent years, the sales of these noncorporate enterprises share represent less than one percent and reflect the continuing trend towards closures and incorporations of the smaller operations.

The cyclical movements of the sales in the textile industry have generally paralleled the total sales in all manufacturing industries with peaks and troughs occassionally preceding trends in the overall economy. Although

Table IV-17. Financial Profile - textile industry 1/

	1967	1978	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
	million dollars												
Shipments (Textile Mill Products)	19,797	21,968	22,952	22,630	24,029	28,036	31,073	32,789	31,064	36,389	40,823	43,888	46,900
Corporate Sales (Textile Mill Products)	18,672	20,841	21,780	21,598	22,930	25,616	29,113	31,220	28,116	33,932	34,931	37,418	41,737
After tax return on sales:	Percent												
All manufacturing	5.0	5.1	4.8	4.0	4.2	4.3	5.0	5.5	4.6	5.3	5.3	5.4	5.7
Textile Mill Products	2.9	3.1	2.9	1.9	2.4	2.6	2.9	2.5	1.5	2.4	2.4	3.1	3.2
After tax return on total assets:													
All manufacturing	6.6	6.6	6.4	5.1	5.2	5.5	6.7	8.0	6.2	7.5	7.6	8.1	8.4
Textile Mill Products	4.5	4.9	4.5	2.8	3.7	4.0	4.7	3.8	2.2	4.2	4.5	5.9	6.2
After tax return on equity:													
All manufacturing	11.2	11.8	11.5	9.3	9.7	10.6	13.1	14.9	11.6	14.0	14.2	15.0	15.0
Textile Mill Products	7.5	8.5	7.9	5.1	6.6	7.5	9.6	8.0	4.4	8.0	8.6	11.5	11.9

1/ Data from Census of Manufactures

Source: Federal Trade Commission, Quarterly Financial Report not apparent from Table IV-17, significant fluctuations in quarterly sales have occurred since 1970. In 1973, a peak occurred as a result of the accelerated buying associated with the threatening shortage during the Mideast oil embargo. This was quickly followed by a dramatic drop in sales reflecting the economic recession in 1975. Since that time, sales have increased at an annual rate of about 10 percent.

Sales of textile products occur predominately in three markets: apparel, home furnishings, and industrial. The apparel market accounts for the greatest portion of the total sales, receiving an estimated 40 percent of the industry shipments. The second largest share of the industry sales occurs in home furnishings which represents about 34 percent. An estimated 23 percent of the industries' sales occur in the industrial market. Overseas sales amount to about 4 percent of total sales.

The long-term outlook for sales can be expected to reflect very closely the projected trends in personal income as well as expenditures for apparels and home furnishings. The real growth rate is not anticipated to exceed the 2.5 percent of the past ten years. However, cyclical movements in sales can be expected to occur and should parallel changes in general economic activity. Industry sales will be significantly influenced by imports of textile products into the United States. These imports, which have been restricted to an annual increase of 6 percent under the MFA, have been posing increasing problems to the domestic mills. This is apparent in considering that about one-fourth of the garments now sold in the U.S. come from abroad, principally from the Far East (Taiwan, Hong Kong, Japan, and Korea).

In addition to the FTC Financial Reports discussed above, financial statistics are also published by the Internal Revenue Service in its Source Book of Income Statistics. These statistics cover a different survey sample and are collected on a fiscal year basis beginning in July; consequentlv the data differ somewhat from that published by the FTC. The Source Book contains data not only for the total industry (major industry) but also for the three principal segments (minor industries): (1) weaving mills and textile finishing, (2) knitting mills, and (3) other textile mill products. This third industry includes the carpet and rug industry as well as the yarn and thread mills. Table IV-18 depicts data for fiscal years 1967 to 1977 (1977 is the latest year for which statistics have been published.) As shown in the exhibit, sales for the major industry increased from $18.5 billion in 1967 to over $33 billion in 1976. These statistics illustrate a drop in sales in 1971 (reflecting that year's recession) which is not readily apparent in the FTC data. Sales in the weaving industry represent about 45 percent of total industry sales while those in the knitting mills account for about 20 percent. The other textile mills account for the remaining 35 percent of the sales. Although the weaving mills make up the largest portion of the industry sales volume, its sales have been increasing only at an average of 4 percent annually as opposed to a 6 percent increase for the remaining portion of the industry. The minor industry sales data reveal that the impact of the 1971 recession occurred at different times among the three industries with a low in sales occurring in 1970 (fiscal year) for the other textile product mills and a low for the weaving and knitting mills occurring in 1971.

Table IV-18. Financial profile 1/ -- textile industry
(major and minor industries

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
	-million dollars-										
Sales:											
Major industry (textiles)	18,523	19,379	20,822	22,053	21,454	23,164	26,463	29,409	30,639	30,101	33,332
Minor industry											
Weaving mills 2/	8,975	9,061	9,731	11,028	10,301	10,838	11,773	12,978	13,815	14,254	15,066
Knitting mills	3,352	2,647	3,703	4,073	3,908	4,793	5,448	5,848	5,585	5,316	5,647
Other	6,196	7,671	7,388	6,952	7,246	7,533	9,242	10,583	11,240	10,531	12,619
	-percent-										
Return on sales (before tax):											
Major industry (textiles)	5.5	4.4	5.3	4.3	3.6	3.6	3.5	4.0	2.5	2.0	1.7
Minor industry											
Weaving mills 2/	6.4	5.0	5.5	5.0	4.2	3.5	4.1	5.1	2.2	2.3	2.1
Knitting mills	3.8	4.3	5.0	3.4	3.7	3.3	3.8	2.2	0.6	2.2	1.1
Other	5.0	3.8	5.1	3.7	2.8	4.0	2.7	3.6	3.2	1.4	1.5
Return on assets (before tax):											
Major industry (textiles)	8.5	6.7	7.8	6.1	5.3	5.5	5.4	6.3	4.1	3.1	2.4
Minor industry											
Weaving mills 2/	8.9	6.6	7.3	6.4	5.4	4.6	5.8	7.1	6.1	3.2	2.4
Knitting mills	7.2	6.1	9.6	6.2	6.2	5.8	6.6	3.6	1.0	3.6	2.0
Other	8.5	7.0	8.0	5.4	4.4	6.9	4.3	6.7	2.7	2.6	2.5

1/ Financial data is based on fiscal year - July to June

2/ Includes textile finishing plants, except knitting and wool processing

Source: Internal Revenue Service, Source Book of Income Statistics

3. Operating Costs

Financial data contained in the Standard and Poors Industry Surveys facilitate a comparison of operating costs between the textile industry and total industrials. These operating costs are listed below and include costs for labor, material, selling, and general and administrative expenses. Costs as a percentage of sales have remained fairly stable over the last ten years for the textile industry as well as all industrials. Total industrials have experienced a slight rise in costs from a low of 84.2 percent in 1967 to a high of 85.7 percent in 1976. The costs in the textile industry have ranged from a low in 1968 of 87.9 percent to a high of 91.4 percent in both 1971 and 1975. The operating costs of the textile industry have remained about 3 to 5 percentage points higher than those for all industrials throughout the time period.

Operating Cost
(as a percent of sales)

Year	Textile Industry	Total Industrials
1979	90.3	N.A.
1978	90.0	N.A.
1977	90.5	N.A.
1976	88.9	85.6
1975	91.4	85.6
1974	88.4	84.6
1973	89.0	84.2
1972	90.4	84.9
1971	91.4	85.4
1970	89.9	85.5
1969	88.7	84.7
1968	87.9	84.2
1967	89.4	84.5

Source: Standard and Poors Industry Surveys.

These operating costs are discussed in detail, below. Material and labor costs were obtained from the Census of Manufactures while the remaining costs were derived from the Source Book of Statistics of Income, (IRS).

a. Costs of materials and labor

Costs of material and labor expressed as a percent of shipments (sales and interplant transfers) are shown in Table IV-19 for various SIC industry groups (3-digit) level) and industries (4-digit level), paralleling to some extent, the IRS Source Book minor industry break-out. Costs of material for the entire industry amount to about 60 percent of shipments while labor costs average about 20 percent. The weaving mills show the highest cost of labor with a rate of 23 percent, one due primarily to the labor intensive narrow fabric and wool processing mills. The labor costs in the textile finishing mills were 19 percent. The combination of weaving and finishing mills, which

Table IV-19. Material and labor costs (1977)
(as a percent of shipments)

SIC	SIC Industry Group	Labor Costs	Material Costs
		------------percent-----------	
221-224	Weaving mills	23	56
226	Textile finishing (weaving)	19	65
221-224, 226	Combined weaving mills and textile finishing	22	60
225	Knitting mills	21	59
227	Carpet and rug mills	12	69
228	Yarn and thread mills	20	63
Total Textile Mill Products		20	60

Source: Census of Manufactures.

constitutes the same coverage of mills as the Source Book in its minor industry break-out, indicates labor costs of 22 percent. The knitting mills had labor costs of 21 percent, slightly less than the combination of weaving and finishing mills. Within the knitting mills, labor costs vary widely among the subsegments. Mills manufacturing knit gloves had labor costs of 32 percent (not shown in the Table) the highest in the entire textile industry. On the other hand, mills producing knit fabrics had one of the lowest costs. Carpet and rug mills had the lowest labor costs of the entire industry with costs at 12 percent. This is due principally to their relatively labor efficient mills.

As may be expected, material costs, when expressed as percentages of shipments, are essentially the opposite of labor costs. Those segments with high labor costs had relatively low material costs; conversely, those with low labor costs had high material cost (as a percent of shipments). The weaving mills had the lowest material costs at 56 percent. Carpet mills had the highest material costs at 69 percent.

b. Depreciation

The study conducted by the Treasury Department on the textile industry (discussed in the previous chapter) concludes that depreciation levels are entirely inadequate to permit the industry to keep abreast of its capital requirements since new machinery costs from two to four times that being replaced. Depreciation, as shown below, remained between 2.8 and 2.9 percent of sales through 1975 and then dropped to 2.5 percent in 1976 where it has remained for the past four years.

The Textile Industry
(depreciation as a percent of sales)

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
2.9	2.9	2.8	2.9	2.8	2.9	2.5	2.5	2.5	2.5

Source: FTC Quarterly Financial Report

Depreciation among the minor industries varied significantly as illustrated below. The weaving mills and textile finishing reported the highest depreciation at levels of about 3.5 percent of sales between 1972 and 1977. The knitting mills reported depreciation of between 2.3 and 2.8 percent during the period. During the same period, the remaining mills (other textile products) experienced a slight decline in levels going from 2.5 percent in 1972 to 2.1 percent in 1974 and 1977. It should be pointed out that the minor industry levels, to a great degree, reflect the depreciation taken by the largest firms. For example, the depreciation for all of the weaving and finishing mills was shown as 3.5 percent. However, in that segment, firms with assets of less than $5 million (80 percent of this minor industry) had depreciation levels of less than 2.5 percent.

Depreciation as a Percent of Sales

	1972	1973	1974	1975	1976	1977
Weaving mills and textile finishing	3.6	3.6	3.5	3.4	3.6	3.3
Knitting mills	2.4	2.4	2.8	2.5	2.5	2.3
Other textile products	2.5	2.3	2.1	2.3	2.4	2.1

Source: Troy's Almanac.

4. Interest Expenses

Because of low levels of profit, the textile industry has had to rely traditionally on internally generated funds for capital investment. The scarcity of long-term credit is evident in the relatively low interest expenses being paid by textile firms as illustrated below. During the period 1970-1976, interest paid by the industry averaged 1.5 percent of sales. This compares with a rate of 1.8 percent for all manufacturing industries for the same period. The interest expenses of the minor industries have fluctuated slightly over the past few years, but in general they have varied between 1.4 and 1.5 percent of sales. The relatively large increase in the percentage for knitting mills in 1974 may be explained by the fact that in 1974, the knitting boom peaked; thus, it is probable many firms were forced to borrow funds to continue in operation. The high rates in 1975 reflected the recession of that year.

	Interest Expenses (as a percent of sales)					
The Textile Industry	1972	1973	1974	1975	1976	1977
Major industry	1.4	1.4	1.5	2.0	1.7	2.0
Minor industry						
Weaving mills & finishings	1.5	1.3	1.5	1.8	1.6	1.3
Knitting	1.4	1.4	1.8	2.4	1.8	1.6
Other	1.3	1.4	1.4	2.0	1.7	1.4

Source: IRS Source Book of Income Statistics

5. Profitability

The relatively weak financial posture of the textile industry is reflected in the number of firms reporting deficits. In 1971, according to the Source Book, 1,776 firms out of a total of 6,221 1/ reported losses which amounted to 29 percent of the firms in the entire industry. In 1976, the total number of firms had increased to 6,274; the number reporting losses increased to 2,735 and represented a total of 44 percent. The generally low levels of profits are apparent in comparing the profitability ratios in the textile industry with those of all manufacturing as was depicted in Table IV-17. As shown, the textile industry's profits have historically been 40 to 50 percent less than the profits of all manufacturing industries.

1/ The number of firms reflect those categorized as textile operations by the Internal Revenue Service. The IRS number of firms does not compare equally to the number of firms reported by the Bureau of the Census due to classification differences.

a. Returns of sales (industry)

Rates of return on sales, equity and assets have been traditionally low in the industry. During the last ten year period, the return on sales (after tax) for the industry has fluctuated between 1.5 percent in 1975 and 3.2 percent in 1978. During the same period, the returns for all manufacturing industries varied from 4.0 percent to 5.5 percent. Annual rates of return for the textile industry have typically been about 40 to 50 percent less than the composite rates of all manufacturing industries.

The return on sales for 1977 was 2.4 percent -- the same as that of 1976 and essentially the same as the average since 1970 (2.3 percent) and for the past 11 years (2.5 percent).

While a review of the return on sales of the total industry indicates its condition relative to that of overall manufacturing, an examination of the rates of firms by asset size reveals the position of the small mills. As shown below, the 1977 return on sales before tax for firms having assets under one million dollars was 1.0 percent. Approximately 72 percent of the firms in the industry fell into this category. Firms with assets of between one and ten million dollars had a composite rate of return of 1.5 percent; these firms made up about 23 percent of the industry. The remaining large firms (amounting to about 5 percent of the industry) had a rate of return of 1.7 percent.

Return on Sales by Size of Firms -- Textile Industry (1977)

Assets	Number of Firms as a Percent of the Total Industry	Return on Sales
Under $1,000,000	72	0.9
$1,000,000 to $10,000,000	23	1.5
Over $10,000,000	5	1.7

Source: IRS, Source Book of Income Statistics

As also shown in Table IV-18, the return on sales of the weaving mills and textile finishers have generally been the highest in the industry when compared to these of the other minor industries. Between 1967 and 1977, these mills averaged 4.3 percent as opposed to about 3.2 percent for the knitting mills. However, when viewing the return of sales of firms with assets under one million dollars, a different picture emerges. The smaller sized firms in both the weaving and knitting segments had less than a one percent rate of return. The same size firms in the other textile mill products segment had a composite rate of almost 3 percent.

b. Returns on sales (wet processors)

The returns on sales for the wet processors within the industry have remained significantly lower than for the total industry. Based on the industry survey data, the return of sales (before tax) has averaged 3.1 percent for the wet processors as opposed to 4.3 percent for the entire industry. The rate of return for wet processors during the 1975 recession for wet processors fell to 1.4 percent (Table IV-20) while the total industry rate dropped to 2.8

Table IV-20. The textile industry, wet processors--
return on sales (before tax)1/
(medians)

Subcategory	1973	1974	1975	1976	1977
Wool scouring	7.8	-0.3	-4.1	7.7	-0.1
Wool finishing	4.0	1.7	-3.4	2.7	0.5
Woven fabric finishing	5.8	2.8	2.2	4.0	1.4
Knit fabric finishing	3.3	3.3	2.3	1.6	2.5
Hosiery finishing	2.5	1.6	1.7	2.6	1.3
Carpet finishing	4.4	4.7	1.6	3.0	3.5
Yarn finishing	9.2	6.6	0.8	3.6	1.9
Nonwoven	3.2	4.6	0.0	0.7	4.3
Wet processors (composite)2/	2.9	4.4	1.4	4.1	2.9
Total industry*	5.4	4.6	2.8	4.4	4.4

1/ Returns on sales of each of the subcategories consist of medians.

2/ Returns on sales for wet processors (composite) consist of the average of all surveys.

Sources: Development Planning and Research Associates, Inc. Industry Survey results.
* Internal Revenue Service, Source Book of Income Statistics.

percent. In 1977, the rate for the wet processors was slightly less than 3 percent compared to 4.4 percent for the industry. An examination of the median rates from the survey data reveals wide fluctuations within and among subcategories. The lowest rates and the widest fluctuations occurred within wool scouring with returns varying between 7.8 and -4.1 percent during the 1973-77 period. The lowest overall rates occurred in wool finishing. The most stable returns have occurred in carpet finishing with the median remaining above 3.0 percent during the period except for 1975 when it dropped to 1.6 percent.

c. Return on assets

As was shown in Table IV-17, the difference between the return on assets of the textile industry and of all manufacturing industries is somewhat less than the difference between the corresponding return on sales. This primarily reflects the labor intensity of the industry and the relative obsolesence of plant and equipment.

In light of the low profitability levels discussed above, the industry requires substantial increases in productivity in order to maintain its viability. To gain this productivity, the industry has shown evidence of significant modernization. Capital expenditures reached $1.4 billion in 1979 with over 80 percent of this funneled into modernization. Less than 20 percent of the outlay will involve expansion in capacities. Although the expenditures will increase dramatically, the expenditures as a percent of sales are expected to remain between 2.5 percent and 3.0 percent. Even though the projected outlay is about the same as the current level of depreciation for the entire industry, modernization is required most extensively in the smaller mills where the capital requirements will exceed the depreciation.

d. Return on equity

Return on equity within the textile industry has been significantly low in relation to that of all manufacturing as shown in Table IV-17. Over the past ten years, the rate of return on all manufacturing industries has fluctuated from 9.3 to 16.5 percent while that of the textile industry has ranged from a low of 4.4 percent in 1975 to 11.9 percent in 1979. According to The Value Line Investment Survey, the return on equity has been consistently rated low in comparison with 49 of the major manufacturing industries as indicated below.

Return on Net Worth - Textile Industry Ranking
(Among 49 industries)

1976	1977	1978	1979	1980
42	46	42	45	45

Source: The Value Line

Among the 500 largest industrials surveyed by Fortune, the median rates of return on stockholder's equity within the textile industry were among the lowest major industrial rates of return in 1975 (23rd out of 24), in 1976, 23 out of 25, 24 out of 25 in 1977, 20 out of 25 in 1978.

The returns on equity of mills within the minor industries has fluctuated over the past years with the knitting mills generally having the higher rates (except in 1975) as indicated below.

Minor Industry	Return on Equity 1972	1973	1974	1975	1976	1977
Weaving and finishing	5.4	4.6	13.7	5.6	2.0	4.6
Knitting	10.4	7.8	19.7	---	3.3	4.7
Other	9.5	3.8	20.2	0.5	0.5	5.4

Source: Troy's Almanac

6. Financial Structure

a. Liquidity

The liquidity of the textile industry is somewhat more favorable than that of total manufacturing as reflected in the current ratios listed below. For the past ten years, the current assets to current liabilities ratio of the textile industry has ranged between 2.2 and 2.4, somewhat higher than that of all manufacturing. Although this is favorable to the textile industry from the point of view of liquidity, it actually is brought about by the requirement for the textile mills to finance a greater portion of their investments from internally generated funds than from external investors.

Current Ratio - Liquidity
(ratios of current assets to current liabilities)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
							(percent)						
All manufacturing	2.2	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.8
Textile industry	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.3	2.3

Source: FTC, Quarterly Financial Reports

Within the textile industry, liquidity has been slightly more favorable in the weaving mills and textile finishing than in the other segments, with ratios ranging from 2.0 to 2.1 between 1972 and 1977 according to Troy's Almanac. The knitting mills have shown somewhat less liquidity with ratios ranging between 1.6 to 2.1 during the same period.

b. Debt to equity

The financial structures of the firms in the manufacturing industries have shown significant changes over the past years with a trend towards a greater debt load. The debt to debt plus equity ratios of the textile industry have generally moved in consonance with the composite ratios of all manufacturing. In 1967, the ratio of all manufactures was slightly over 41 percent and increased to 49.3 percent in 1979. The ratios within the textile industry have moved from 40.9 percnet in 1967 to nearly 49 percent in 1973. The decline since 1973 has not been as abrupt for the textile industry as for all manufacturing which tends to illustrate the difficulty of firms in the industry to obtain equity funding as well as debt funding.

Debt to Debt Plus Equity

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
							(percent)						
All manufacturing	41.4	43.8	45.4	46.3	46.6	46.8	48.0	46.5	46.4	46.2	46.6	47.8	49.3
Textile industry	40.9	42.3	44.1	44.0	43.9	47.1	48.7	48.7	47.3	47.9	48.4	48.6	48.1

Source: FTC, Quarterly Financial Reports

Within the textile industry, the financial structure of the mills varies significantly among minor industries as shown below. The debt load in the knitting mills has been close to 60 percent. This indicates that the recent expansion in knitting equipment was facilitated by debt financing as opposed to equity financing. This again reflects the problems within the industry in obtaining support from the equity markets.

Debt to Debt Plus Equity

	1972	1973	1974	1975	1976	1977
			(percent)			
Weaving and finishing	41	41	41	44	45	53
Knitting	57	55	58	66	61	44
Others	47	55	50	54	54	46

Source: IRS, Source Book of Income Statistics

c. Debt structure

The current debt as a percentage of total liabilities within the textile industry has been slightly higher than for all manufacturing. As shown below, this percentage for the textile industry decreased from about 60 percent in 1967 to a low of almost 52 percent in 1971. Since 1971, it had increased to 57.4 percent by 1976. The increase indicated that current needs were being financed increasingly with short-term money during the period. This is contrary to what seems to be occurring in all manufacturing. The overall trend for most industries is typically toward increased financing through long-term debt.

Debt Structure
(Current debt to total debt)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
	(percent)												
All manufacturing	55.6	54.7	55.0	53.3	52.1	52.6	55.1	53.8	50.4	50.8	51.0	52.3	54.2
Textile industry	59.6	59.9	56.4	53.6	51.9	53.3	53.3	55.8	54.1	57.4	56.9	55.8	56.5

Source: FTC, Quarterly Financial Reports

d. Capital structure

During the period 1967-1979, the textile industry's long-term debt as a percent of long-term debt plus equity increased from 22 percent to 29 percent as shown below. This again reflects the increasing difficulty of obtaining external financing through the equity markets within the industry.

Capital Structure
(Long-term debt to long-term debt plus equity)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
	(percent)												
All manufacturing	24.1	26.1	27.2	28.7	29.5	29.4	29.3	29.5	29.2	28.1	28.8	31.3	31.0
Textile industry	21.8	22.7	25.6	27.0	27.4	29.3	30.8	28.7	30.0	29.7	28.8	29.5	28.9

Source: FTC, Quarterly Financial Reports

Among the minor industries, the capital structure varied significantly during the period. The weaving mills carried the lowest debt with a 21 percent load between 1969 and 1976. The knitting mills carried the highest load with its long-term debt increasing from 25 percent in 1969 to just under 45 percent in 1976. This reflects the volatility experienced within the knitting mills during the early 1970's associated with the rapid growth in the acquisition of new machines.

Capital Structure
(Long-term debt to long-term debt plus equity)

	1969	1970	1971	1972	1973	1974	1975	1976	1977
	(percent)								
Textile industry (composite)	22	24	24	25	28	28	26	29	30
Weaving and finishing	19	20	20	22	21	23	21	22	20
Knitting	25	27	34	34	34	41	38	45	36
Others	25	29	25	26	35	30	28	33	33

Source: IRS, Source Book of Income Statistics

7. Cost of Capital - After Tax

The current cost of capital was determined for purposes of this analysis by estimating various performance measures of the industry. The weights for the two respective types of capital for the textile industry were estimated utilizing the FTC data previously discussed, with the equity weight being 65 percent and the debt weight being 35 percent. The actual cost of debt was more difficult to estimate as the industry is comprised of a large number of diversified public firms and relatively specialized privately held firms. Accordingly, various equity cost-related measures were viewed, including the averages of numberous published sources estimations of P/E and D/P ratios for the textile industry. From these sources, the cost of equity capital was determined to be approximately 12.0 percent.

To determine the weighted average current cost of capital, the before tax costs are adjusted to after-tax costs (debt capital only in this case.) This is accomplished by multiplying the capital costs by one minus the tax rate (assumed to be 48 percent). These computations are shown below and result in the estimated current after-tax cost of capital being 10.0 percent.

Item	Weight	Before tax cost	Tax rate	After tax cost	Weighted cost
Debt	.35	12.0	0.48	6.2	2.2
Equity	.65	--	--	12.0	7.8
Cost of capital					10.0

It should be noted that this cost of capital estimate is not reflective of the industry's present capital costs, but rather, it is reflective of a long term capital cost including both highs and lows experienced by the industry.

8. Assessment of Ability to Finance New Investment

a. Financing new investment

The ability of a firm to finance new investment for pollution abatement is a function of several critical financial and economic factors. In general terms, new capital must come from one or more of the following sources:

(1) funds borrowed from outside sources; (2) equity capital through the sale of common or preferred stock; (3) internally generated funds--retained earnings and the stream of funds attributed to the depreciation of fixed assets.

For each of the three major sources of new investment, the most critical set of factors is the financial condition of the individual firm. For debt financing, the firm's credit rating, earnings record over a period of years, stability of earnings, existing debt-equity ratio, and the lenders' confidence in management will be major considerations. New equity funds through the sale of securities will depend upon the firm's future earnings as anticipated by investors, which in turn, will reflect past earnings records. The firm's record, compared to others in its own industry and to firms in other similar industries, will be a major determinant of the ease with which new equity capital can be acquired. In the comparisons, the investor will probably look at the trend of earnings for the past five or so years.

Internally generated funds depend upon the margin of profitability and the cash flow from operations. Also, in publicly-held corporations, stockholders must be willing to forego dividends in order to make earnings available for reinvestment.

The firm's industry and general economic conditions are also major considerations in attracting new capital. The industry will be compared to other similar industries in terms of net profits on sales and on net worth, supply-demand relationships, trends in production and consumption, the state of technology, impact of government regulations, foreign trade, and other significant variables. Declining or depressed industries are not good prospects for attracting new capital. At the same time, the overall condition of the domestic and international economy can influence capital markets. A firm is more likely to attract new capital during a boom period than during a recession. On the other hand, the cost of new capital will usually be higher during an expansionary period. Furthermore, the money markets play a determining role in new financing.

These general guidelines can be applied to the textile industry by looking at general economic data and industry performance over the recent past.

b. General industry situation

The textile industry experienced declining profitability during the 1973 to 1975 time period with profits as a percentage of sales declining from 2.9 percent in 1973 to 1.5 percent in 1975 (Table IV-21). However, in 1976, profits rose (coinciding with general improvements in the overall domestic economy) and in 1976 and 1977 the industry earned a 2.4 percent return on sales. This increased to 3.1 percent in 1978 and 3.2 percent in 1979. As was shown in Table IV-16, the textile industry's profits have consistently been less than those experienced by the aggregated group of all industrial firms.

Table IV-21. The textile industry, general financial summary

	1972	1973	1974	1975	1976	1977	1978	1979
After tax return on sales (%)	2.6	2.9	2.5	1.5	2.4	2.4	3.1	3.2
After tax return on assets (%)	4.0	4.7	3.8	2.2	4.2	4.5	5.9	6.2
Debt to equity ratio	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.1
Current assets to current liabilities ratio	2.3	2.2	2.2	2.3	2.2	2.2	2.3	2.3

Source: Federal Trade Commission, Quarterly Financial Reports

Returns on assets for the textile industry are also shown on Table IV-21. The annual industry returns generally follow the same pattern as the industry's returns on sales. The industry's return on assets was 4.5 percent in 1977 and increased by 6.2 percent by 1979.

Another factor relative to the industry's capability to finance new investments is the proportion of debt to equity the industry maintains. As shown in Table IV-21, the debt to equity ratio has remained relatively constant since 1972 at 0.9 with debt representing 45 percent of the total of debt and equity.

Often, depending on the size of the investment, firms will choose short-term financing in lieu of long-term debt financing. Relevant to such a situation is the industry's current ratio, that is, the ratio of the industry's current assets to its current liabilities. As depicted in Table IV-21, this ratio has been relatively constant since 1972 with current assets representing 2.2 to 2.3 times the current liabilities. The historical ratios indicate the industry has not experienced any industry-wide liquidity problems.

The immediate financial future for the textile industry does not look good. As noted previously the textile industry tends to suffer during recessionary periods such as during the recession of 1974 and 1975. As a result, earning's prospects for 1981 and 1982 appear to be very poor. High interest rates and oversupply of some types of material have added to industry problems. For example demand for corduroy and denim expanded rapidly in the late seventies with commensurate increases in capacity. When demand decreased the industry was again caught in an oversupply situation.

c. Expenditures for plants and equipment

Capital expenditures, as reported by the U.S. Department of Commerce, were relatively stable in the early 1960's, increasing slowly from approximately $326 million in 1960 to $382 million in 1963 (Table IV-22). Beginning in 1964 and continuing through 1966, capital expenditures increased and more than doubled in 1966 to $887 million. In 1967 and 1968, expenditures for capital improvements declined, and beginning in 1969, and continuing through 1974, capital expenditures increased every year over the previous years except in 1973. In 1974, the textile industry spent approximately $1.2 billion on capital improvements. In 1975, these expenditures declined to $997 million; in 1976, they increased to approximately $1.1 billion. In 1979, these expenditures amounted to about $1.5 billion.

Capital expenditures for the period 1970-1979 (expressed as a percent of sales) are compared below with depreciation. During the period, reinvestment has averaged about 92 percent of depreciation. This contrasts to the 1960's when reinvestment averaged about 120 percent of depreciation.

Table IV-22. The textile industry, total capital expenditures, 1960-79

Year	Capital Expenditures (Million $)
1960	326
1961	322
1962	376
1963	382
1964	504
1965	618
1966	887
1967	733
1968	691
1969	849
1970	811
1971	873
1972	1,127
1973	1,121
1974	1,169
1975	997
1976	1,087
1977	1,235
1978	1,396
1979	1,463

Source: U.S. Department of Commerce, Industrial Outlook.

Comparison of Capital Expenditures
and Depreciation

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Capital expenditures, percent of shipments	3.6	3.6	4.0	3.6	3.6	3.2	3.0	3.0	3.2	3.1
Depreciation, percent of sales	2.9	2.9	2.8	2.9	2.8	2.9	2.5	2.5	2.5	2.5

Source: FTC Quarterly Financial Report and U.S. Department of Commerce, Industrial Outlook.

As shown in Table IV-23, for 1975 - 1977, most of the industry's capital expenditures have been for new machinery and equipment. In 1976, for the total industry, new machinery and equipment expenditures represented 85 percent of the total industry expenditures with the remaining 15 percent representing expenditures predominantly for new structures and additions to existing facilities. The total capital expenditures and the various components for each of the major industry segments are also depicted in Table IV-23 for the years 1975 and 1977.

d. Capital availability

Recently, the textile industry has experience a period of moderate growth coupled with relatively low profit levels. These factors have a considerable influence on the industry's ability to generate new capital for capital improvements and are expected to influence the industry's ability to finance investments for pollution controls and for other regulatory requirements.

The industry has a large number of family-owned (or controlled) facilities, especially in the small and medium size categories. Most of the larger mills are a part of larger multi-plant corporations. The family-owned mills are largely financed with internal capital and maintain relatively low levels of long-term debt. While new capital expenditures have increased during the past 15 years, expenditures during the past 5 years have somewhat stabilized.

The extent to which investment requirements will impose capital problems on the mills will depend on the individual mill's financial situation as well as the size of the investment requirements. Some problems are anticipated for some plants in the industry in their attempts to obtain capital. Others, particularly the more profitable and, perhaps, the larger mills, are not expected to encounter much difficulty. Potential sources of financing available to the industry include internal financing, banks and fiduciaries, stock or bond issues, or small business loans obtainable through the U.S. Environmental Protection Agency.

Table IV-23. The textile industry, expenditures for new plants and equipment, 1975-76

Segment	SIC	Total New Expenditures			New Structures and Additions to Plants			New Machinery and Equipment		
		1975	1976	1977	1975	1976	1977	1975	1976	1977
		(Million Dollars)								
Textile Mills Products Industry	22	996.7	1,087.4		222.0	163.3		774.8	924.1	
Weaving Mills, Cotton	221	133.4	124.3	187.2	24.0	15.4	32.8	109.4	108.9	154.4
Weaving Mills, Manmade Fiber & Silk	222	192.2	245.6	260.2	31.9	16.8	23.3	160.3	228.8	236.9
Weaving Mills, Wool	223	10.9	41.7	14.9	2.0	12.5	4.0	8.9	29.1	11.0
Narrow Fabric Mills	224	12.1	11.3	16.2	2.2	2.2	4.0	9.9	9.1	12.1
Knitting Mills	225	228.3	203.8		66.8	38.7		161.6	165.1	
Dyeing & Finishing Mills	226	91.5	116.7	129.7	19.5	20.0	20.9	72.0	96.8	108.7
Floor Covering Mills	227	52.6	60.4	82.4	14.6	9.8	12.1	38.0	50.6	70.4
Yarn and Thread Mills	228	160.5	166.6	180.1	23.7	23.7	24.0	136.8	142.9	156.0
Miscellaneous Textile Goods	229	115.3	116.9	112.5	37.4	24.1	29.5	77.9	92.8	82.6

Source: U.S. Department of Commerce.

V. PRICES AND PRICE DETERMINATION

Textile product prices have increased during the past decade, however the rates of price increases have lagged behind those of most other manufactured products. The major reasons for the restraint in textile price increases are generally a result of stiff competition between fiber types and competition from less expensive textile imports. Improvements in the industry's production efficiency, especially in the man-made fiber mills, also has helped to minimize required price increases. Prices in the textile industry are determined through the interaction of numerous factors which effect both its supply and demand characteristics. Demand has been strong in recent years due to increases in the general population as well as increases in the per capita textile purchases. This has caused the industry to operate at its highest historical production level. Prices are also influenced by occurences such as strikes, oil shortages, and government price supports and regulations.

In this chapter the major pricing processes are discussed including reviews of supply and demand relationships, the price determination processes, and trends in prices of raw materials and finished textile goods.

A. Supply and Demand Relationships

The supply and demand for textile fibers and goods are based on a number of price and non-price factors which have changed over time. For example, the uncertain supply and price fluctuations associated with cotton were withstood for many years until man-made fibers offered mills a relatively steady source of raw materials. As man-made fiber prices declined and their quality improved, their use was even more attractive and their demand by textile mills and consumers increased. Today, if cotton prices were to decline to levels below those of man-made fibers, textile mills would in all probability continue to predominately utilize man-made fibers because of their long run price and supply stability as well as consumer acceptance of man-made fibers.

While man-made fibers have moved rapidly into many major markets, most are utilized in the manufacture of apparel and home furnishings. Likewise, the major use of natural fibers such as cotton and wool is for the manufacture of apparel. Cotton was the major textile input in 1965, supplying 51 percent of the fiber used, but its use fell to 27 percent by 1979. In that same time period, the use of man-made fibers grew from 23 to 73 percent of all fibers used for textile goods.

1. Supply

The raw materials for textile fibers are predominately derived from four resources: animal hair, cotton, plant cellulose, and petroleum chemicals. Wool and cotton originate at farms and their production is dominated by natural factors. Man-made fibers are less vulnerable; the only major condition to production being the availability of plant cellulose and oil. The supply of finished goods depends upon the price and availability of fibers, the technology available, and the financial condition of the mills.

Imports of raw materials have little effect on domestic supplies with wool being the only fiber imported in significant quantities. However, imports of foreign semi-manufactured and manufactured products are commanding an increasing share of the U.S. market, which reduces the demand for U.S. fiber in turn.

a. Raw materials

Raw material supplies have changed in character over the past decade as the gap left by wool, cotton, and rayon and acetate has been filled by non-cellulosic fibers. Fewer Sheep were raised and consequently, the wool supply has declined to about half its level from 1965. The amount of cotton planted, harvested, and produced has remained steady. Among the man-made materials, the rayon and acetate group has declined, while non-cellulosic fibers have increased dramatically.

Wool. The supply of wool has declined steadily since 1965 (Table V-1). Among the reasons for the drop are a decreasing demand for wool fabrics and the rising value of sheep meat. Some ranchers are raising sheep for meat rather than wool while others are completely switching from raising sheep to cattle. In 1965, ranchers raised 25,127,000 sheep and lambs and of these 23,756,000 were shorn. By 1979 the number of sheep and lambs on farms had fallen to 12,244,000 sheep and lambs raised with 12,800,000 shorn. Reported wool produced dropped from 224,763,000 pounds to about 103,000,000 pounds between 1965 and 1979 1/

Domestically raised sheep have a tendency to produce less wool than sheep in most other wool producing countries, i.e. the fine wool breeds of Austrailia and New Zealand. This has been due, in part, to an increased emphasis on meat carcass quality at the expense of wool quality and yields.2/ To offset this, the U.S. government has encouraged increased wool production by enacting and updating its price support programs. The original goal of the first program, the National Wool Act of 1954, was to guarantee wool growers a minimum price at which their wool could be sold, which in turn, encourages an increase in annual production. This price support program has been extended several times with the most recent extension to continue through 1981. In this program the difference between the actual average selling price and the guaranteed price level paid to the growers is derived from customs duties collected on imported wool and wool products.

1/ It should be noted that the number of sheep and lambs on farms is reported as of January 1 of each year. Lambs born after January 1 may be shorn, placed in a feedlot and marketed as fat lambs before the following January 1 date. As a result the number of sheep and lamb shorn in any given year may exceed the number on farms on the January 1 reporting date.

2/ Ward, Lionel E., "Interfiber Competition With Emphasis on Cotton", Ann Arbor: University Microfilms International, 1969.

Table V-1. Number of sheep and lambs, sheep and lambs shorn, and production in the United States, 1965-1978

Year	All sheep and lambs 1/	Sheep and lambs shorn 2/	Reported wool production Grease Basis
	(1,000 head)	(1,000 head)	(1,000 pounds)
1965	25,127	23,756	224,763
1966	24,734	22,923	219,153
1967	23,898	22,056	211,384
1968	22,140	20,759	197,896
1969	21,238	19,584	182,849
1970	20,423	19,163	176,787
1971	19,686	19,036	172,157
1972	18,710	18,816	168,618
1973	17,724	17,598	153,239
1974	16,394	16,142	138,663
1975	14,512	14,403	124,835
1976	13,311	13,669	114,817
1977	12,766	13,214	108,627
1978	12,348	12,609	102,424
1979	12,244	12,826	103,063

1/ As of January 1.

2/ Includes sheep shorn at commercial feed lots. The number of sheep and lambs shorn may exceed the number of all sheep and lambs on farm as of the January 1 reporting date. This is because lambs born after January 1 may be shorn, placed in a feedlot and marketed as fat lambs before the following January 1 reporting date.

Source: U.S. Department of Agriculture, Cotton and Wool Situation, May 1979 and U.S. Department of Agriculture, Agricultural Statistics, 1980.

Wool produced in the U.S. is typically apparel quality wool, therefore, in order to protect domestic production, imported apparel wools are subject to a duty of 25.5 cents per pound. Carpet class wools are not produced in this country so fibers imported for carpet use are not dutiable. In 1965, 33 percent of the total U. S. wool supply was imported for apparel (Table V-2). Imports declined annually until 1974, when a low of 11,800,000 pounds, or 7 percent of the total supply was reached. Since 1974, wool imports, which are mainly from Australia and New Zealand, rose and in 1978 imported wool for apparel represented over 21 percent of the total U.S. wool supply. This is due, as previously mentioned, to the curtailment of wool production by domestic producers. The quantity of carpet wool imported to the United States for rugs and carpeting however, has declined with the expansion of man-made fibers into these markets. Also shown in Table V-2, between 1965 and 1978, carpet wool supplies fell from 108,943,000 pounds to 23,404,000 pounds. The total U.S. wool supply has declined from 496,343,000 pounds in 1965 to 145,330,000 pounds in 1979, a reduction of 71 percent.

Cotton. As depicted in Table V-3, the supply of cotton has vacillated within the past decade. In 1965, 14,152,000 acres of cotton were planted, compared with 13,948,000 acres in 1979. During that time, plantings have fluctuated decreasing to about 9 million acres in 1967 and 1975 then increasing to around 14 million acres in 1972 and 1979. Until the late 1960's the market situation was usually one of oversupply with prices varying only a few cents from year to year. United States' price controls, supports, and subsidies, created in the 1930's, left the government with large surpluses of raw cotton which it would dispose of randomly, depressing the domestic and world cotton markets. In the late 1960's, the government altered its policy and held smaller surplus stocks, making cotton production and pricing more sensitive to real changes in supply and demand. Increased demand and higher prices encouraged oversupply, followed by declines in price, plantings, and supply shortages.

Acres of cotton planted is at the discretion of the crop producers, with weather and insects affecting the level of production. Cotton production is also influenced by various government programs designed to control supply and support prices. Several control methods have been employed since government programs began in 1933. Among the programs initiated were acreage allotments, payments for acreage diversion or soil conservation, direct payments, and Commodity Credit Corporation non-recourse loans. One program in particular, the Food and Agriculture Act of 1977, has provisions covering cotton for the next four years. Average loan rates and a target price of 52 cents per pound for upland cotton have been established. Total deficiency payments to producers was limited to $40,000 in 1978. All program benefits will be based on planted acres rather than an allotment system.

The total supply of cotton in the United States decreased by nearly one-third from 1965 to 1967. Since 1967, however, the supply has remained relatively stable, varying between 15 and 17 million bales available annually. Table V-4 depicts the annual supply of cotton in the United States as well as showing the relative importance of beginning stocks

Table V-2. Sources of raw wool in the United States, 1965-1979

Year	Apparel Wool						Imported Carpet wool[2]		Total supply	
	Domestic supply		Dutiable imports[1]		Total apparel wool					
	(1,000 pounds)	Percent	(1,000 pounds)	Percent	(1,000 pounds)	Percent	(1,000 pounds)	Percent	(1,000 pounds)	Percent
1965	224,763	45.3	162,637	32.8	387,400	78.1	108,943	21.9	496,343	100.0
1966	219,153	44.2	162,537	32.7	381,690	76.9	114,625	23.1	496,315	100.0
1967	211,384	53.0	109,071	27.4	320,455	80.4	78,205	19.6	398,660	100.0
1968	197,896	44.3	129,717	29.0	327,613	73.3	119,599	26.7	447,212	100.0
1969	182,849	49.1	93,523	25.1	276,372	74.3	95,664	25.7	372,036	100.0
1970	176,787	53.6	79,810	24.2	256,597	77.8	73,325	22.2	329,922	100.0
1971	172,157	57.6	42,682	14.3	214,839	71.9	83,893	28.1	298,732	100.0
1972	168,618	63.6	24,790	9.3	193,408	72.9	71,849	27.1	265,257	100.0
1973	153,239	71.8	19,587	9.2	172,826	80.9	40,694	19.1	213,520	100.0
1974	138,663	83.7	11,800	7.1	150,463	90.9	15,147	9.1	165,610	100.0
1975	124,835	78.8	16,605	10.5	141,440	89.3	17,021	10.7	158,461	100.0
1976	114,817	66.6	38,387	22.3	153,204	88.9	19,076	11.1	172,280	100.0
1977	108,627	67.2	34,175	21.2	142,802	88.4	18,780	11.6	161,582	100.0
1978	99,146	78.6	27,000	21.4	126,144	84.4	23,404	15.6	149,548	100.0
1979	103,000	70.9	20,283	14.0	123,283	84.8	23,047	15.2	146,330	100.0

[1] Apparel wool is dutiable, 25.5 cents per pound (clean basis)

[2] Carpet wool is duty-free since none is produced in the U.S.

Source: U.S. Department of Agriculture, Cotton and Wool Situation.

Table V-3. U.S. Cotton: acreage planted and harvested, yield per acre on harvested acreage and production, 1965-1979

Year	Planted acreage	Harvested acreage	Yield per acre	Production
	1,000 acres	1,000 acres	pounds	1,000 bales
1965	14,152	13,615	498	14,973
1966	10,349	9,552	480	9,557
1967	9,448	7,997	447	7,443
1968	10,912	10,160	516	10,926
1969	11,882	11,055	434	9,990
1970	11,945	11,155	438	10,192
1971	12,355	11,471	438	10,477
1972	14,001	12,984	507	13,704
1973	12,480	11,970	520	12,974
1974	13,699	12,567	441	11,540
1975	9,493	8,796	453	8,302
1976	11,656	10,914	465	10,581
1977	13,372	12,814	520	13,202
1978	13,369	12,367	421	10,841
1979	13,948	12,816	548	14,629

Source: U.S. Department of Agriculture, Cotton and Wool Situation, February, 1979.

Table V-4. Cotton fiber, total United States supply, 1965-1979

Year	Beginning stocks		Annual production		Imports		Total supply	
	1,000 Bales 1/	Percent	1,000 Bales 1/	Percent	1,000 Bales 1/	Percent	1,000 Bales 1/	Percent
1965/66	14,249	48.6	14,938	51.0	118	0.4	29,305	100.0
1966/67	17,078	63.9	9,557	35.7	105	0.4	26,740	100.0
1967/68	12,344	61.9	7,443	37.3	149	0.7	19,936	100.0
1968/69	6,584	37.5	10,926	62.2	68	0.4	17,578	100.0
1969/70	6,544	39.5	9,990	60.2	52	0.3	16,586	100.0
1970/71	5,843	36.4	10,192	63.4	37	0.2	16,072	100.0
1971/72	4,203	28.5	10,477	71.0	72	0.5	14,752	100.0
1972/73	3,258	19.2	13,704	80.6	34	0.2	16,996	100.0
1973/74	4,221	24.5	12,974	75.2	48	0.3	17,243	100.0
1974/75	3,808	24.8	11,540	75.0	34	0.2	15,382	100.0
1975/76	5,708	40.4	8,302	58.9	92	0.7	14,102	100.0
1976/77	3,681	25.7	10,581	74.0	38	0.3	14,300	100.0
1977/78	2,928	16.8	14,496	83.1	20	0.1	17,444	100.0
1978/79	5,347	33.0	10,856	66.9	4	0.1	16,207	100.0
1979/80*	3,958	21.3	14,630	78.6	15	0.1	18,603	100.0

1/ One bale equals 480 pounds

* Estimated

Source: U.S. Department of Agriculture, Cotton and Wool Situation.

(predominately government-owned surplus cotton) and imports. As shown, in 1965, surplus cotton represented nearly 50 percent of the total cotton available that year. Although year-to-year fluctuations have occurred, by 1979 surplus cotton represented only 21.3 percent of the total supply.

Imports of raw cotton to the United States have historically remained of relatively little significance, accounting for less than 1.0 percent of the total annual supply.

Man-made fibers. Unlike the natural fibers, the supply of man-made fibers has increased dramatically, from 2.4 million pounds in 1965 to 10.4 million pounds in 1979. These gains have not been shared by all types of man-made fibers, with the supply of textile glass and non-cellulosic fibers rising, while the supply of rayon and acetate has fallen (Table V-5). Production of man-made fibers is cheaper, less risky, and more adaptable to new technologies than the natural fibers. The quality of these fibers is constantly improving, often imitating or combining with natural fibers thereby discovering new uses and creating greater demand.

If companies over-anticipate projected demands in one period, future production must be reduced in the next period to prevent huge inventories and potential losses. In 1973, 6,309 million pounds of non-cellulosic fiber were produced while there was a capacity for 7,040 million pounds (Table V-5). In 1979, manufacturers had the capacity to produce 9,804 million pounds but actually only produced 8,437 million pounds of non-cellulosic fiber. Consequently these plants are capable of increasing the supply of fibers if the demand necessitates it. The major limiting factor in the supply of man-made raw fibers is the shortage or extreme price increase of petroleum chemicals.

Only a small portion of the U.S. man-made fiber supply is imported. In 1965, 145 million pounds of these fibers were imported, increasing to only 202 million pounds by 1978 and dropping to 99 million pounds in 1979 (Table V-5). Before 1971, the amount of textile glass fiber imported was insignificant, but it is becoming increasingly more important. Rayon and acetate fiber quantities have wavered over the years whole non-cellulosic fiber imports grew until 1972 and then began declining. In 1965, imports supplied 5.4 percent of the man-made fiber available in the U.S. In 1979, that amount dropped to 1.0 percent. From this data it can be seen the main import competition for man-made fibers has been in the form of finished apparel and goods, not as fibers.

b. Finished goods

The available supply of finished textile goods has increased from 9,050 million pounds of goods in 1965 to 14,023 million pounds in 1979. As shown in Table V-6, while the overall supply of textile goods has increased since 1965, the composition of the goods have changed significantly, including the increasing importance of imported textile goods. The following depicts the major fiber types of finished goods.

Table V-5, Man-made fibers: Total U.S. supply, 1965-1979.

Year	Textile glass			Rayon and Acetate			Non-cellulosics			Total		Imports as percent of total domestic production
	Domestic production	Imports	Total	Domestic production	Imports	Total	Domestic production	Imports	Total	Domestic production	Imports	
	(million pounds)											(percent)
1965	282	*	282	1,527	84	1,611	1,780	61	1,841	3,589	145	5.4
1966	332	*	332	1,519	118	1,637	2,082	84	2,166	3,933	202	6.6
1967	308	*	308	1,388	93	1,481	2,353	78	2,431	4,049	171	6.2
1968	402	*	402	1,594	140	1,734	3,229	124	3,353	5,226	264	7.3
1969	501	*	501	1,576	95	1,671	3,527	100	3,627	5,606	195	5.1
1970	467	*	467	1,373	84	1,457	3,586	179	3,765	5,427	263	6.0
1971	468	2	470	1,391	86	1,477	4,293	328	4,621	6,152	416	8.2
1972	572	9	581	1,394	62	1,456	5,355	328	5,683	7,322	399	6.9
1973	688	13	701	1,357	66	1,423	6,309	253	6,562	8,354	332	5.2
1974	683	12	695	1,199	48	1,247	6,223	165	6,388	8,105	225	3.6
1975	547	9	556	749	47	796	5,885	109	5,994	7,181	246	2.8
1976	676	14	690	841	68	909	6,626	131	6,757	8,144	213	3.2
1977	787	23	810	888	82	970	7,328	145	7,473	9,002	250	3.3
1978	923	22	950	905	67	972	7,783	113	7,896	9,611	202	2.3
1979	1,012	10	1,022	930	30	960	8,437	59	8,496	10,378	99	1.0

* denotes less than 0.5 million pounds

Source: Textile Economic Bureau, Inc., Textile Organon, Feb. 1980.

Man-made fibers, capacity, production, and utilization, 1973-1979.

Year	Textile glass			Rayon and Acetate			Non-cellulosic			Total		
	Capacity	Production	Utilization	Capacity	Production	Utilization	Capacity	Production	Utilization	Capacity	Production	Utilization
	million pounds	million pounds	percent	million pounds	million pounds	percent	million pounds	million pounds	percent	million pounds	million pounds	percent
1973	739	688	93.1	1,493	1,357	90.9	7,040	6,309	89.6	9,272	8,354	90.1
1974	821	683	83.2	1,373	1,199	87.3	7,759	6,223	80.2	9,953	8,105	81.4
1975	909	547	60.2	1,239	749	60.5	8,436	5,886	69.8	10,584	7,181	67.8
1976	893	676	75.7	1,193	841	70.5	9,132	6,626	72.6	11,218	8,143	72.6
1977	1,002	787	78.5	1,063	888	83.5	9,068	7,328	78.2	11,433	9,002	78.7
1978	1,118	928	83.0	1,086	905	83.3	9,571	7,783	81.3	11,775	9,616	81.7
1979	1,305	1,014	77.7	1,109	930	83.9	9,804	8,437	86.1	12,218	10,381	85.0

NA denotes not available

Scource: Textile Economic Bureau, Inc., Textile Organon, July 1980.

Table V-6. Total fiber equivalent of textile products available in the United States' markets, 1965-1979.

	Wool						Cotton					
Year	U.S. mill consumption	% of total wool	Wool imports	% of total wool	Total wool available	Total wool as % of total supply	U.S. mill consumption	% of total cotton	Cotton imports	% of total cotton	Total cotton available	Total cotton as % of total supply
	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)	(%)
1965	387	71.3	156	28.7	543	6.0	4,453	92.5	361	7.5	4,814	53.2
1966	370	72.1	143	27.9	513	5.3	4,621	90.1	510	9.9	5,131	52.6
1967	312	71.7	123	28.3	435	4.5	4,414	90.9	443	9.1	4,857	50.2
1968	230	61.2	146	38.8	376	3.6	4,104	89.6	474	10.4	4,578	43.8
1969	313	70.7	130	29.3	443	4.1	3.973	89.1	488	10.9	4,461	41.6
1970	240	67.4	116	32.6	356	3.4	3,774	89.1	463	10.9	4,237	40.7
1971	191	68.0	90	32.0	281	2.4	3,965	88.9	493	11.1	4,458	38.0
1972	219	69.7	95	30.3	314	2.4	3,850	86.3	611	13.7	4,461	34.8
1973	151	62.7	90	37.3	241	1.8	3,643	86.6	564	13.4	4,207	31.0
1974	93	55.7	74	44.3	167	1.4	3,306	86.8	503	13.2	3,809	31.6
1975	110	61.8	68	38.2	178	1.5	3,069	86.0	501	14.0	3,570	30.9
1976	122	55.5	98	44.5	220	1.7	3,389	82.7	709	17.3	4,098	31.9
1977	108	48.0	117	52.0	225	1.7	3,170	82.6	669	17.4	3,839	28.4
1978	115	47.1	129	52.9	244	1.7	3,040	78.2	845	21.8	3,885	27.8
1979	111	50.2	110	49.8	221	1.6	3,066	80.4	746	19.6	3,812	27.2

	Man-Made								Total available				
Year	Rayon and acetate mill consumption	% of total man-made	Non-cellulosic mill consumption	% of total man-made	Man-made imports	% of total man-made	Total man-made available	Total man-made as % of total supply	Total mill consumption	% of total supply	Total imports	% of total supply	Total available supply
	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)	(%)	(mil lbs)
1965	1,593	43.1	2,021	54.7	79	2.2	3,693	40.8	8,454	93.4	596	6.6	9,050
1966	1,623	39.5	2,367	57.5	123	3.0	4,113	42.2	8,981	92.0	776	8.0	9,757
1967	1,520	34.7	2,725	62.2	139	3.1	4,384	45.3	8,971	92.7	705	7.3	9,676
1968	1,711	31.1	3,595	65.4	193	3.5	5,499	52.6	9,640	92.2	813	7.8	10,453
1969	1,624	28.0	3,928	67.6	258	4.4	5,810	54.2	9,838	91.8	876	8.2	10,714
1970	1,426	24.5	4,075	69.9	329	5.6	5,830	55.9	9,515	91.3	908	8.7	10,423
1971	1,506	21.6	5,024	72.0	451	6.5	6,981	59.6	10,686	91.2	1,034	8.8	11,720
1972	1,428	17.7	6,138	76.3	480	6.0	8,046	62.8	11,635	90.7	1,186	9.3	12,821
1973	1,389	15.2	7,275	79.7	465	5.1	9,129	67.2	12,458	91.8	1,119	8.2	13,577
1974	1,107	13.7	6,591	81.7	371	4.6	8,069	67.0	11,097	92.1	948	7.9	12,045
1975	802	10.3	6,614	84.6	400	5.1	7,816	67.6	10,595	91.6	969	8.4	11,564
1976	855	10.0	7,198	84.4	480	5.6	8,533	66.4	11,564	90.0	1,287	10.0	12,851
1977	869	9.2	8,032	85.2	531	5.6	9,432	69.9	12,179	80.2	1,317	9.8	13,496
1978	880	8.9	8,348	84.6	643	6.5	9,871	70.5	12,383	88.5	1,617	11.5	14,000
1979	831	8.3	8,634	86.4	525	5.3	9,990	71.2	12,642	90.2	1,381	9.8	14,023

Source: U.S. Department of Agriculture, Cotton and Wool Situations, and Textile Economic Bureau, Inc., Textile Organon.

Wool goods. The current supply of wool goods has decreased to about one-half the amount available in 1965. The decline in availability of wool has occurred both for wool imported into the United States and domestically produced wool products. Also the proportion of the total available textile goods supply represented by wool has declined; from 6.0 percent in 1965 to 1.6 percent in 1979. In 1965, the total domestic supply consisted of 543 million pounds of wool (Table V-6). Of this 1965 supply, 387 million pounds or 71 percent of the total, were provided by domestic mills with the remainder being accounted for by imported woolen products. In 1979, the total wool supply available declined to 221 million pounds with domestic mills accounting for 50 percent, or half, of the total, and imports accounting for the other half.

Table V-7 indicates that of the total 109.5 million pounds of raw wool equivalent imported into the United States in 1979, 76.4 percent (83.7 million pounds) was in the form of manufactured woolen products with the remainder being in raw wool or semi-manufactured form. As illustrated in the table, the percentage of manufactured wool imports has increased, from 65 to 70 percent in the late 1960's to around 80 percent in 1975-1979.

Table V-8 depicts U.S. mill consumption of raw wool on a scoured basis from 1965 to 1979. As shown, in 1979, 91 percent of all wool consumed was for apparel fabrics with the remainder being consumed by wool carpet mills. Historically, carpet mills utilized considerably more wool; now, however, their consumption of wool has declined from 112 million pounds in 1965 to approximately 10 million pounds in 1979.

Wool is predominately manufactured into broad woven fabrics and carpets and rugs. The majority of woolen and worsted fabrics are used in the manufacture of women's and children's apparel, followed by apparel for men and boys. As shown in Table V-9, production of woolen and worsted fabrics have declined from 267.3 million linear yards in 1965 to a low of 78.9 million yards in 1975. Since 1975 the production of these woolen fabrics has increased such that in 1979, 115.6 million linear yards were produced. This recent increase has been attributed to the economic recovery of the nation's general economic state coupled with the increased consumer demand for natural fibers.

Cotton goods. The total supply of cotton available in the U.S. has declined in recent years from 4,814 million pounds in 1965 to 3,812 million pounds in 1979 (Table V-6). While most cotton goods are domestically manufactured, the proportion of the U.S. total cotton products' supply accounted for by imported cotton goods has increased, rising from 7.5 percent of the total cotton goods supply available in 1965 to 19.6 percent in 1979. This rise in the proportion of cotton imports represents the doubling of the quantity of cotton imported between 1965 and 1979, and the decline of domestic cotton supplied by over 30 percent. In 1965, domestic cotton accounted for 4,453 million pounds and imports, 361 million pounds. By 1979, domestic cotton had declined to 3,066 million pounds while cotton imports increased to 746 million pounds.

Table V-7. Raw wool equivalent of wool imports, 1965-1979

	Semi-manufactured		Manufactured		Total wool imports	
Year	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent
1965	45,047	28.9	111,069	71.7	156,116	100.0
1966	48,167	33.7	94,691	66.3	142,858	100.0
1967	39,798	32.2	83,636	67.8	123,434	100.0
1968	50,168	34.4	95,799	65.6	145,967	100.0
1969	42,295	32.6	87,375	67.4	129,670	100.0
1970	36,441	31.3	80,119	68.7	116,560	100.0
1971	22,137	24.7	67,568	75.3	89,705	100.0
1972	15,502	16.3	79,875	83.7	95,377	100.0
1973	17,729	19.7	72,233	80.3	89,962	100.0
1974	15,166	20.4	59,059	79.6	74,225	100.0
1975	12,819	18.7	55,603	81.3	68,422	100.0
1976	17,988	18.2	80,591	81.8	98,579	100.0
1977	25,297	21.7	91,256	78.3	116,553	100.0
1978	31,943	25.1	97,476	74.9	129,419	100.0
1979	25,856	23.6	83,687	76.4	109,543	100.0

Source: U.S. Department of Agriculture, Cotton and Wool Situation

Table V-8. United States' mill consumption of raw wool, scoured basis, 1965-1979

	Apparel wool		Carpet wool		Total consumption	
Year	Million pounds	Percent	Million pounds	Percent	Million pounds	Percent
1965	275	71.1	112	28.9	387	100.0
1966	266	71.9	104	28.1	370	100.0
1967	229	73.2	84	26.8	313	100.0
1968	238	72.1	92	27.9	330	100.0
1969	219	70.0	94	30.0	313	100.0
1970	164	68.0	77	32.0	241	100.0
1971	116	60.7	75	39.3	191	100.0
1972	142	65.1	76	34.9	218	100.0
1973	110	72.8	41	27.2	151	100.0
1974	75	80.6	18	19.4	93	100.0
1975	94	85.5	16	14.5	110	100.0
1976	107	87.7	15		122	100.0
1977	95	88.0	13	12.0	108	100.0
1978	102	88.7	13	12.3	115	100.0
1979	101	91.0	10	9.0	111	100.0

Source: U.S. Department of Agriculture, Cotton and Wool Situation.

Table V-9. U.S. broad woven goods and tire cord production, 1965-1979

Year	Broad woven goods				Total tire cord and tire fabrics
	Woolen and worsted fabrics	Cotton fabrics	Man-made fiber fabrics	Total	
	(million linear yards)				(million pounds)
1965	267.3	9,237.8	3,899.2	13,404.3	495.8
1966	264.9	8,839.8	4,208.5	13,313.2	526.2
1967	238.6	8,278.1	4,216.5	12,733.2	471.9
1968	245.1	7,465.7	5,243.0	12,953.8	573.8
1969	222.5	6,968.0	5,378.5	12,569.0	641.0
1970	178.6	6,245.9	5,017.3	11,441.8	582.2
1971	112.6	6,147.5	4,870.5	11,130.6	622.9
1972	102.5	5,614.3	5,552.9	11,269.7	674.6
1973	106.0	5,085.7	6,088.4	11,280.1	685.6
1974	81.0	4,713.6	5,860.1	10,654.7	650.1
1975	78.9	4,094.7	5,278.3	9,451.9	523.0
1976	97.3	4,546.3	6,113.5	10,757.0	538.2
1977	101.7	4,371.9	6,220.4	10,694.0	605.4
1978	116.6	4,007.2	6,657.3	10,727.7	637.5
1979	115.6	3,931.6	6,585.0	10,632.2	556.8

Source: U. S. Department of Agriculture, Cotton and Wool Situation, and current Industrial Reports, Broadwoven Fabrics, (gray), Series MQ22T, and Textile Organon.

Of the 722 million pounds of cotton goods imported into the United States in 1979, Table V-10 depicts that 503.5 million pounds (69.7 percent) were in the form of manufactured cotton products (primarily apparel) with the remainder being predominately woven cotton cloth (28.6 percent). Since 1965, the proportion of imported cotton in manufactured form has increased (from about 40 percent in 1965); the proportion represented by woven cotton cloth has decreased (from about 50 percent in 1965); and the proportion of cotton yarn has decreased (from about 6.8 percent in 1965 and 20.0 percent in 1966). Imported cotton thread, which has consistently represented approximately 0.1 percent of the total cotton imported, has varied, in quantity, from year to year but usually ranged between 300,000 and 450,000 pounds annually.

As shown in Table V-11, the majority of domestically fabricated cotton is manufactured into cotton broad woven fabrics. In 1979, domestic mills consumed an estimated 6.6 million bales of cotton. Of this amount, almost 4.0 million bales (58.0 percent) were for cotton broad woven fabrics with 1.3 million bales (20.6 percent) being utilized for polyester/cotton blended fabrics while 1.4 million bales (21.8 percent) were utilized for other cotton textile products. When compared to data for 1979, the total estimated mill consumption was 26 percent higher than in 1967 when 8.9 million bales were consumed with over 82 percent (7.3 million bales) of that amount being utilized in cotton broad woven fabrics, 4.8 percent (0.4 million bales) in blends, and 13.1 percent (1.2 million bales) being utilized in other cotton textile products. These changes in respective proportions reflect the decline in the number of bales of cotton utilized for broad woven fabrics since 1967 and the increase in the use of cotton in polyester/cotton blended fabrics.

The decline in the quantities of cotton broad woven fabrics was also illustrated in Table V-9. As shown in the table, in 1965, cotton fabrics accounted for 9.2 billion linear yards or 69 percent of the total 13.4 billion yards of broad woven fabrics produced. However, by 1979, cotton fabrics accounted for only 3.9 billion yards or 37 percent of the total 10.6 billion yards of broad woven fabrics produced. This decline in the use of cotton was fairly steady from 1965 to 1975 when cotton broad woven fabrics reached its all time production low since 1965. Since 1975 however, the quantity of cotton used increased slightly and appears to have somewhat leveled off in 1979.

Man-made goods. The total supply of man-made fiber goods has experienced tremendous growth in recent years with the quantity of man-made goods available increasing by nearly three times, from 3.7 billion pounds in 1965 to 10.0 billion pounds of goods in 1979 (Table V-6). In terms of the market share, man-made goods represented 40.8 percent of the total textile goods supply in 1965 which increased 71.2 percent by 1979.

As also shown in Table V-6, of the total man-made goods available in 1965, rayon and acetate goods represented 43.1 percent, non-cellulosic goods represented 54.7 percent, and imports represented 2.2 percent. By 1979, the proportion of rayon and acetate goods had declined to only 8.3 percent and non-cellulosic goods increased their share to 86.4 percent. During the same period imports also increased their respective share, from 2.2 percent in 1965 to 6.5 percent in 1978, and 5.3 percent in 1979.

Table V-10. Raw cotton equivalent of U.S. cotton imports for consumption by cotton manufacturers, 1965-1979.

	Yarn		Thread		Woven cloth		Primary manufactured products		Total	
Year	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent
1965	24,414	6.8	324	0.1	178,397	49.4	157,575	43.7	360,710	100.0
1966	101,919	20.0	345	0.1	228,222	44.7	179,811	35.2	510,297	100.0
1967	43,620	9.8	277	0.1	213,916	48.2	185,572	41.9	443,385	100.0
1968	57,217	12.1	456	0.1	210,918	44.5	205,255	43.3	473,846	100.0
1969	31,049	6.4	337	0.1	243,776	50.0	212,735	43.6	487,897	100.0
1970	24,338	5.3	377	0.1	236,052	51.0	202,410	43.7	463,177	100.0
1971	31,734	6.4	296	0.1	241,338	49.0	219,208	44.5	492,576	100.0
1972	39,421	6.5	334	0.1	313,277	51.3	257,671	42.2	610,703	100.0
1973	25,563	4.5	373	0.1	303,502	53.9	234,063	41.5	563,501	100.0
1974	13,025	2.6	336	0.1	259,480	51.6	229,838	45.7	502,679	100.0
1975	11,334	2.3	341	0.1	222,122	44.3	267,455	53.4	501,252	100.0
1976	25,688	3.6	474	0.1	318,634	45.0	363,805	51.3	708,601	100.0
1977	13,126	2.0	330	---	238,648	35.7	417,303	62.3	669,407	100.0
1978	30,334	3.8	427	0.1	247,051	30.9	520,835	65.2	798,647	100.0
1979	11,857	1.6	535	0.1	206,434	28.6	503,472	69.7	722,298	100.0

Source: U.S. Department of Agriculture, Cotton and Wool Situation.

Table V-11. Estimated U.S. mill consumption of raw cotton, by major textile product type, 1967-1979.

Year	Cotton broadcloth fabrics		Polyester/cotton blended fabrics		Other textile products		Total estimated consumption	
	1,000 bales[1]	Percent	1,000 bales[1]	Percent	1,000 bales	Percent	1,000 bales	Percent
1967	7,319	82.1	428	4.8	1,173	13.1	8,920	100.0
1968	6,614	77.5	699	8.2	1,225	14.3	8,538	100.0
1969	6,240	75.6	795	9.6	1,218	14.8	8,253	100.0
1970	5,845	74.7	837	10.7	1,143	14.6	7,825	100.0
1971	5,392	64.4	835	10.0	2,149	25.6	8,376	100.0
1972	5,055	62.8	941	11.7	2,053	25.5	8,049	100.0
1973	4,534	59.7	1,114	14.7	1,949	25.6	7,597	100.0
1974	4,181	60.0	1,072	15.4	1,718	24.6	6,971	100.0
1975	3,803	59.8	1,040	16.4	1,517	23.8	6,360	100.0
1976	4,247	58.8	1,317	18.2	1,661	23.0	7,225	100.0
1977	3,955	58.4	1,320	19.5	1,497	22.1	6,773	100.0
1978	3,670	57.0	1,243	19.3	1,541	23.9	6,454	100.0
1979	3,777	57.6	1,349	20.6	1,431	21.8	6,557	100.0

Source: U.S. Department of Agriculture, Cotton and Wool Situation.

As stated previously, in 1979 imported man-made yarn goods represented 5.3 percent of the total man-made goods available which represent total man-made imports of 525 million pounds. Of these imports, 81.0 percent were in the form of primary manufactured products (predominately apparel), 12.4 percent were woven cloth and fabric, 5.4 percent were man-made fiber yarns, and 1.2 percent were sliver, tops, and rovings (Table V-12). Since 1965, the annual quantities of man-made imports have increased significantly, from 79 million pounds in 1965 to 640 million pounds imported in 1978 and 522 million pounds in 1979. In 1965, primary manufactured products were still the main imported form accounting for 64.7 percent of all man-made imports in that year. Imports of woven cloth and fabric accounted for 33.7 percent of all man-made imports in 1965, and man-made yarns accounted for 1.5 percent. Viewing the respective quantities of man-made imports over time, all have increased significantly. However, man-made goods in manufactured form have experienced the greatest growth, increasing by about 725 percent from 51 million pounds in 1965 to 422 million pounds in 1979.

Man-made fibers are predominately manufactured into broad woven fabrics. However, tire cords and fabrics, carpets, and hosiery are also predominately manufactured from man-made fibers. Broad woven fabrics manufactured from man-made fibers have increased in recent years from 3.9 billion linear yards in 1965 to almost 6.6 billion yards in 1979 (Table V-9). Compared to other broad woven fabrics, man-made fabrics represented 29 percent of the total broad woven fabric production in 1965 and increased their share to 62 percent in 1979. Within man-made broad woven fabrics the trend has been toward less rayon and acetate fibers and more non-cellulosic fibers. According to information available in Textile Organon[1] during the past eight years, the supply of broad woven rayon and acetate, 100% filament fibers decreased significantly, as did 100% spun rayon and acetate with blends of other fibers. Non-cellulosic broad woven goods production increased between 1971 and 1979. Of the 100% filament non-cellulosic fibers, the polyester supply increased at the highest rate, from 233 to 521 million linear yards. Polyester and cotton blends also increased during the eight year period, from 1,998.6 to 2,455.9 million linear yards.

Another major use of man-made fibers is for the manufacture of tire cords and fabrics. As was also shown in Table V-9, production of these items has varied from year to year with an overall increasing trend over time. In 1965, 495.8 million pounds of tire cords and fabrics were produced. By 1979, production of such items amounted to 556.8 million pounds.

The production of carpet experienced a period of growth from 1965 to 1973; however since 1973 production has somewhat stabilized. In 1965, total shipments of broadloom carpets amounted to 301.9 million square yards and by 1973, shipments reached 842.2 million square yards (Table V-13). Since 1973, the annual shipments have stabilized varying between 700 and 900 million square yards annually.

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[1] Textile Economic Bureau, Inc., Textile Organon.

Table V-12. Man-made fiber equivalent of U.S. man-made imports for consumption by manufacturers, 1965-1979.

Year	Sliver, tops and rovings		Yarns		Woven cloth and fabric		Primary manufactured products		Total	
	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent
1965	53	0.1	1,171	1.5	26,663	33.7	51,145	64.7	79,032	100.0
1966	759	0.6	3,856	3.1	45,937	37.3	72,513	58.9	123,065	100.0
1967	147	0.1	8,889	6.4	33,704	24.3	96,078	69.2	138,818	100.0
1968	70	---	18,267	9.4	43,384	22.4	131,604	68.1	193,325	100.0
1969	780	0.3	16,058	6.2	51,741	20.1	188,881	73.4	257,460	100.0
1970	1,790	0.5	24,125	7.3	57,089	17.3	246,254	74.8	329,258	100.0
1971	777	0.2	22,962	5.1	75,953	16.8	351,380	77.9	451,072	100.0
1972	2,894	0.6	27,293	5.7	83,504	17.4	366,762	76.3	480,453	100.0
1973	4,225	0.9	29,071	6.2	76,408	16.4	355,615	76.4	465,319	100.0
1974	2,392	0.6	11,541	3.1	62,287	16.8	295,032	79.5	371,252	100.0
1975	3,113	0.8	11,383	2.8	54,738	13.7	331,142	82.7	400,376	100.0
1976	2,844	0.6	16,339	3.4	64,478	13.4	395,826	82.6	479,487	100.0
1977	4,799	0.9	34,926	6.6	70,382	13.3	421,023	79.3	531,130	100.0
1978	7,556	1.2	49,620	7.8	87,760	13.7	495,035	77.4	639,971	100.0
1979	6,653	1.2	28,238	5.4	64,577	12.4	422,793	81.0	522,261	100.0

Source: U.S. Department of Agriculture, Cotton and Wool Situation.

Table V-13. Shipments of broadloom carpets, 1965-1978.

Year	Woven		Tufted		Total	
	(million sq yds)	(percent)	(million sq yds)	(percent)	(million sq yds)	(percent)
1965	41.3	13.7	260.6	86.3	301.9	100.0
1966	42.6	12.9	288.7	87.1	331.3	100.0
1967	40.0	10.9	328.6	89.1	368.6	100.0
1968	39.9	9.2	394.7	90.8	434.6	100.0
1969	39.3	7.9	455.3	92.1	494.6	100.0
1970	34.1	6.4	502.3	93.6	536.4	100.0
1971	31.3	5.3	558.5	94.7	589.8	100.0
1972	34.1	4.4	734.3	95.6	768.4	100.0
1973	32.8	3.9	809.4	96.1	842.2	100.0
1974	32.6	4.1	756.4	95.9	789.0	100.0
1975	26.7	3.8	676.7	96.2	703.4	100.0
1976	27.7	3.5	762.2	96.5	789.9	100.0
1977	25.0	2.9	834.8	97.7	859.8	100.0
1978	25.3	2.8	892.7	97.2	918.0	100.0
1979						

Source: Carpet and Rug Institute, Annual Report.

As shown in Table V-14, the majority of carpets manufactured in recent years have been composed of man-made fibers. The only natural fiber which has been significantly used in carpets in the past was wool, but recently its use has declined. In 1972, wool fibers represented approximately 5.0 percent of the fibers used in carpets. By 1978, this percentage had dropped to less than 1.0 percent.

The supply of hosiery has increased slightly between 1967 and 1979 with 230.3 million dozen pairs produced in 1967 and 294.5 million dozen pairs produced in 1979 (Table V-15). While the number of pairs of men's, children's, and infant's hosiery produced annually have increased since 1967, the number of women's pairs has decreased slightly.

There has also been a shift in women's hosiery away from stockings, toward pantyhose, sheer knee-hi's and anklets. The majority of hosiery is composed of man-made fibers. In a period covering January through April 1977, for example, 56 percent of total hosiery was nylon, 29 percent was acrylic, 12 percent was cotton, one percent was polyester, and two percent was other fibers.[1]

2. Demand

Demand, for purposes of this analysis, reflects demand by the mills for raw materials as well as demand by consumers for finished textile products. Raw material demand is associated with the availability of fibers and the market forecasts for consumer desires. The major end-uses of textiles, which depict consumer demand, are apparel, home furnishings, and industrial uses. These are typically sold to households, businesses and industries, and the government. A small quantity of textile products are exported.

a. Raw Materials

In response to changing technologies and consumer demands, the types of fibers processed in textile mills have shifted away from wool, cotton, and silk to man-made. As shown in Table V-16, in 1965, 57.6 percent of the fibers consumed by U.S. mills was cotton, wool, or silk with the remaining 42.4 percent of the total fibers being man-made. By 1979, man-made fibers had increased their respective share of all fibers consumed to 74.7 percent with significant declines experienced for all the natural fibers. A discussion of the demand for each of the major fiber types is presented below.

Natural Fibers. The annual quantities of wool, cotton, and silk fibers consumed by U.S. mills are depicted in Table V-16. As shown, the quantity of wool consumed has declined from 457 million pounds in 1965 to 135 million pounds in 1979. As was shown in Tables V-1 and 2, this decrease in mill demand for wool fiber has closely corresponded to declines in reported raw wool production and the associated total supply of wool fibers.

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[1] Textile Economics Bureau, Inc., Textile Organon. July 1977, 117.

Table V-14. Carpet composition - face yarns consumed, 1972-1978

	1972		1973		1974		1975		1976		1977		1978	
	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent
Cotton	12,018	0.9	10,944	0.7	3.619	0.3	2,997	0.2	2,971	0.2	1,704	0.1	NA	NA
Rayon/acetate	75,374	5.5	54,154	3.6	23,273	1.7	19,104	1.6	12,109	0.9	7,525	0.5	NA	NA
Wool	68.861	5.0	40,012	2.6	10,138	0.8	15,027	1.2	13,152	1.0	13,459	0.9	12,814	0.8
Nylon filament	480,946	34.9	579,114	38.2	567,527	42.6	495,464	40.8	519,822	38.0	624,190	39.5	675,286	41.6
Nylon spun	337,550	24.5	417,188	27.5	370,436	27.8	371,777	30.6	495,525	36.2	589,991	37.4	589,847	36.4
Acrylic/modacrylic	147,066	10.6	140,100	9.2	127,309	9.5	93,553	7.7	83,977	6.1	77,245	4.9	66,898	4.1
Polyester	185,335	13.4	186,937	12.3	158,223	11.9	150,199	12.3	180,413	13.2	184,306	11.7	176,004	10.9
Polypropylene	66,856	4.8	83,707	5.5	69,772	5.2	65,968	5.4	57,660	4.2	73,013	4.6	82,015	5.0
All others	5,022	0.4	3,777	0.3	3,141	0.2	2,598	0.2	2,743	0.2	7,353	0.5	19,028	1.2
Total	1,379,028	100.0	1,515,933	100.0	1,333,438	100.0	1,216,687	100.0	1,368,372	100.0	1,578,786	100.0	1,621,892	100.0

Source: The Carpet and Rug Institute, Directory and Annual Report, 1977, 1978, and 1979.

NA: Not available

Table V-15. United States production of hosiery, 1967- 1979.

Year	Womens		Mens		Childrens		Infants		Total	
	Mil doz pairs	Percent	Mil doz pairs	Percent	Mil doz pairs	Percent	Mil doz pairs	Percent	Mil doz pairs	Percent
1967	119.6	51.9	54.4	23.6	35.6	15.5	20.7	9.0	230.3	100.0
1968	121.9	55.3	50.1	22.7	30.2	13.7	18.1	8.2	220.3	100.0
1969	128.1	53.1	57.2	23.7	35.5	14.7	20.6	8.5	241.4	100.0
1970	125.7	51.5	64.2	26.3	33.6	13.8	20.6	8.4	244.1	100.0
1971	95.1	45.1	59.7	28.3	36.0	17.1	20.1	9.5	210.9	100.0
1972	102.7	45.1	63.5	27.9	40.0	17.6	21.7	9.5	227.9	100.0
1973	99.9	43.9	63.7	28.0	41.2	18.2	22.6	9.9	227.4	100.0
1974	88.7	41.0	64.2	29.7	41.4	19.1	22.1	10.2	216.4	100.0
1975	97.7	43.5	63.2	28.1	41.9	18.6	22.0	9.8	224.8	100.0
1976	113.8	44.8	66.0	26.0	46.4	18.3	27.7	10.9	253.9	100.0
1977	110.6	43.0	69.3	26.9	49.0	19.0	28.4	11.0	257.3	100.0
1978	110.9	42.0	76.4	29.0	46.7	17.7	29.8	11.3	263.8	100.0
1979	141.7	48.1	72.2	24.5	48.4	16.4	32.2	10.9	294.5	100.0

Source: Textile Economics Bureau, Inc., Textile Organon, July 1980.

Table V-16. U.S. mill consumption of man-made, cotton, wool and silk fibers.

Year	Rayon and acetate		Non-cellulosic & textile glass		Total man-made fiber		Wool		Cotton		Silk		Total	
	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent
1965	1,593.3	44.1	2,020.8	55.9	3,614.1	42.4	457.0	5.4	4,452.6	52.2	6.3	.1	8,530.0	100.0
1966	1,623.2	40.7	2,366.9	59.3	3,990.1	44.1	427.9	4.7	4,621.0	51.1	4.6	.1	9,043.6	100.0
1967	1,520.4	35.8	2,724.9	64.2	4,245.3	47.0	366.6	4.1	4,414.2	48.9	2.8	*	9,028.9	100.0
1968	1,710.8	32.2	3,594.7	67.8	5,305.5	54.1	378.4	3.9	4,104.1	42.0	4.0	*	9,792.0	100.0
1969	1,623.8	29.2	3,928.3	70.8	5,552.1	56.2	354.9	3.6	3,972.6	40.2	3.3	*	9,882.9	100.0
1970	1,426.1	25.9	4,074.8	74.1	5,500.9	57.6	273.3	2.9	3,733.6	39.5	1.8	*	9,509.6	100.0
1971	1,506.0	23.1	5,023.2	76.9	6,529.2	60.9	219.3	2.1	3,965.1	37.0	1.7	*	10,715.3	100.0
1972	1,428.2	18.9	6,137.5	81.1	7,565.7	64.9	246.9	2.1	3,849.8	33.0	2.1	*	11,664.5	100.0
1973	1,389.2	16.0	7,275.0	84.0	8,664.2	69.3	182.1	1.5	3,643.3	29.2	2.8	*	12,492.4	100.0
1974	1,107.6	14.4	6,590.4	85.6	7,698.0	69.2	116.5	1.1	3,306.1	29.7	2.6	*	11,123.2	100.0
1975	802.0	10.9	6,614.5	89.1	7,416.5	69.9	132.0	1.2	3,068.7	28.9	1.0	*	10,618.2	100.0
1976	855.3	10.6	7,197.2	89.4	8,052.5	69.5	145.9	1.3	3,389.0	29.2	2.8	*	11,590.2	100.0
1977	868.2	9.8	8,019.3	90.2	8,887.5	72.9	133.9	1.1	3,169.8	26.0	1.6	*	12,192.8	100.0
1978	879.7	9.5	8,348.0	90.5	9,227.7	74.9	141.6	1.1	3,040.4	24.5	2.0	*	12,411.7	100.0
1979	830.6	8.8	8,634.3	91.2	9,464.9	74.7	134.5	1.1	3,066.4	24.2	1.5	*	12,667.3	100.0

* less than 0.05 percent

Source: Textile Economics Bureau, Inc., Textile Organon.

The demand by textile mills for cotton fiber has also declined. As shown in Table V-16, in 1965 mills consumed 4.5 billion pounds of cotton while in 1979, only 3.1 billion pounds were consumed, a reduction of 31 percent. However, it should be noted the decline in cotton consumption by the mills actually tended to level-off in 1974 and has remained consistently between 3.0 and 3.4 billion pounds since. Some manufacturers are now indicating a belief that the worst of the cotton decline is over and that cotton consumption may start moderately increasing. This belief may be, in part, due to the fact that consumers are returning to "natural goods" and that cotton and man-made fibers are becoming more competitively priced.

Silk, a predominately imported fiber, also has declined in use by U.S. textile mills. In 1965, mills consumed 6.3 million pounds of silk. By 1979 this quantity had declined to 1.5 million pounds (Table V-16). The reasons for these declines in the use of silk include the increasing costs associated with its production and the ability of man-made fibers to imitate qualities associated with silk.

In addition to demand for natural fibers by U.S. mills, natural U.S. fibers are also consumed by textile producers in other countries. Table V-17 depicts the exports of U.S. raw fibers from 1965 to 1979. As shown, exports of wool have fluctuated from year to year with quantities ranging from lows of about 7.8 million pounds in 1969 and 1977 to a high of 55.3 million pounds in 1972. The main importers of U.S. wool fibers have been the United Kingdom and Japan. Total U.S. wool exports typically represent one percent or less of the total U.S. raw fiber exports.

With respect to exports of cotton fibers the U.S. has usually held the position of the world's largest exporter. In 1965, 3,035,000 bales (1,456 million pounds) were exported with 6,835,000 bales (3,280 million pounds) exported in 1979 (Table V-17). A combination of a large supply of cotton and competitive prices caused by the dollar's decline in the world markets has benefited the export market. Also, the major competitor in cotton exports, the USSR, has held off from offering quantities of cotton at the prevailing market price. The major recipients of U.S. cotton are Korea, Japan and the People's Republic of China. Much of this fiber returns to the U.S. in the form of imported goods.

Man-made fibers. The consumption of man-made fibers has increased with the production of textile glass and non-cellulosic fibers out-weighing the decline in use of rayon and acetate fibers. While the consumption of rayon and acetate declined by 48 percent between 1965 and 1979, the demand for textile glass and non-cellulosic fibers increased from 2,027 million pounds to 8,634 million pounds (Table V-16). These man-made fibers have adapted to a variety of end uses and have gradually developed into different markets.

Table V-17. U.S. raw fiber exports to the world, 1965- 1979.

					Man-made fibers				Total	
	Wool		Cotton		Rayon & acetate		Non-cellulosic			
Year	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent	1,000 pounds	Percent
1965	8,633	0.5	1,456,800	88.9	50,883	3.1	122,680	7.5	1,638,996	100.0
1966	10,383	0.4	2,320,800	91.9	53,053	2.1	141,647	5.6	2,525,883	100.0
1967	10,560	0.5	2,093,280	90.9	56,314	2.4	142,397	6.2	2,302,551	100.0
1968	15,913	1.0	1,356,000	83.6	75,391	4.6	174,549	10.8	1,621,853	100.0
1969	7,803	0.5	1,381,440	82.0	80,535	4.8	214,146	12.7	1,683,924	100.0
1970	11,213	0.5	1,870,560	83.4	97,434	4.3	264,476	11.8	2,243,683	100.0
1971	23,364	1.2	1,624,800	80.8	87,625	4.4	275,444	13.7	2,011,233	100.0
1972	55,341	1.8	2,549,280	84.4	85.572	2.8	331,182	11.0	3,021,375	100.0
1973	36,522	1.0	2,939,040	81.8	24,150	0.7	594,244	16.5	3,593,956	100.0
1974	25,181	1.0	1,884,480	73.4	40,891	1.6	617,699	24.1	2,568,251	100.0
1975	27,266	1.3	1,589,280	76.1	26,791	1.3	446,114	21.4	2,089,451	100.0
1976	13,078	0.5	2,296,320	79.7	28,987	1.0	541,056	18.8	2,879,441	100.0
1977	7,875	0.2	2,632,320	81.5	57,667	1.8	533,689	16.4	3,231,551	100.0
1978	8,179	0.2	2,966,400	78.5	86,904	2.3	719,734	19.0	3,781,217	100.0
1979	NA	NA	3,280,800	NA	106,507	NA	1,127,241	NA	NA	

Source: U.S. Department of Agriculture, Cotton and Wool Situation, and Textiles Economic Bureau, Inc., Textile Organon.

An increasing quantity of man-made fibers is exported each year. In 1965, a total of 173.6 million pounds of fibers was exported. By 1979, the total had grown to 1,234 million pounds (Table V-17). Rayon and acetate fiber exports rose steadily from 1965 to 1972 and then declined to below 1965 levels. In 1977, exports of rayon and acetate fibers climbed again to above 1965 levels, and have continued to increase to a 1979 export level of 106 million pounds. Non-cellulosic fiber exports have risen between 1965 and 1977, from 122.7 million pounds to 1,127.2 million pounds, respectively. Foreign countries typically are not as dependent on U.S. man-made fiber as they are for cotton fiber. Farm-produced cotton demands conditions of land and proper climate which are often lacking in foreign countries. However, factory produced synthetic fibers can be manufactured almost anywhere.

b. Finished Goods - By Fibers

Demand for finished textile goods can be approached from two perspectives. First, textile goods' demand can be viewed from the trends in the consumers' buying habits with respect to the finished goods fiber contents and second, the demand can be viewed from the consumers' buying habits with respect to product categories. In this section the demand for finished goods with emphasis on fiber content is discussed. In the subsequent section finished good demand trends with emphasis on end-use markets are discussed.

The competitive position of fibers is determined predominately by price, consumer demands and fabric characteristics. Prices are determined by raw material production costs and by the additional costs required to process the product. Availability of raw materials and supplies also influence cost. Technological advances have reduced production costs, although these price decreases may be outweighed by other cost increases. Fabric characteristics also give fibers advantages. Wool has heat retaining qualities which make it more popular in the north than in the south. Cotton was once considered the ideal material to be used in linens, however, cotton and man-made fiber blending has developed to the point where the advantages of cotton are retained while the favorable characteristics of man-made fibers are added.

Table V-18 depicts the quantities and respective proportions of the major fibers utilized in textile goods from 1965 to 1978. As shown, and as discussed in previous sections, the use of wool, cotton, and rayon and acetate in textile goods has declined in recent years with their combined proportion of all textile goods declining from 76.4 percent in 1965 to 34.5 percent in 1978. The fiber replacing these "traditional fibers" has been non-cellulosic man-made fiber which has increased its position from 23.6 percent of all textile goods in 1965 to 65.5 percent in 1978.

Demand trends and characteristics of each major fiber type are discussed below.

Wool fibers. Wool has assumed little of the textile market since 1965, when it retained six percent of the total textiles consumed. This fiber now represents 1.5 percent of the fabric used (Table V-18). Apparel dominates

Table V-18. All textiles goods, utilization in textile goods by fiber type, 1965-1978

					Man - Made					
	Wool		Cotton		Rayon and Acetate		Non cellulosics		Total Fabric For All Textiles	
Year	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent
1965	547	6.4	4,410	51.4	1,594	18.6	2,029	23.6	8,580	100.0
1966	526	5.9	4,456	49.7	1,613	18.0	2,372	26.5	8,967	100.0
1967	471	5.2	4,263	47.3	1,560	17.3	2,725	30.2	9,019	100.0
1968	483	4.9	4,112	41.6	1,729	17.6	3,552	36.0	9,876	100.0
1969	435	4.4	4,022	40.4	1,620	16.3	3,885	39.0	9,962	100.0
1970	350	3.6	3,851	39.7	1,419	14.6	4,074	42.0	9,694	100.0
1971	261	2.5	3,933	37.0	1,488	14.0	4,937	46.5	10,619	100.0
1972	283	2.4	4,035	34.0	1,410	11.9	6,136	51.7	11,864	100.0
1973	217	1.7	3,752	29.9	1,387	11.1	7,184	57.3	12,540	100.0
1974	148	1.3	3,509	30.4	1,140	9.9	6,751	58.4	11,548	100.0
1975	156	1.4	3,223	29.9	819	7.6	6,571	61.1	10,769	100.0
1976	180	1.5	3,506	30.0	871	7.4	7,137	61.1	11,694	100.0
1977	179	1.5	3,353	27.3	871	7.1	7,877	64.1	12,280	100.0
1978	192	1.5	3,248	26.0	877	7.0	8,199	65.5	12,516	100.0

Source: Textile Economic Bureau, Inc., Textile Organon the end product usage of wool, averaging about 67 percent of the wool used annually. Home furnishings are second in wool consumption in recent years, (about 18 to 21 percent), and industrial and other consumer goods and exports share the remaining end-use markets (Table V-19).

Cotton Fibers. Cotton dominated the textile market in 1965, supplying 51 percent of the textile fibers consumed. By 1978, however, cotton consumption declined to 26 percent (Table V-18). Apparel has always demanded the largest share of cotton usage, averaging about 50 percent of all cotton consumed (Table V-20). Home furnishings utilized the second largest amount of cotton (25 to 30 percent), while industrial and other consumer goods were third in demand (15 to 20 percent). Although cotton exports have risen in their market share over the last few years from three percent in 1965 to 6.7 percent in 1978, exportation demands the smallest quantities of cotton.

Man-made Fibers. Utilization of all man-made fibers has increased since 1965 with the increase attributable to non-cellulosic fibers, since utilization of rayon and acetate fibers decreased. As was shown in Table V-18, consumption of non-cellulosic fibers increased from 23.6 percent of total textile goods in 1965 to 65.5 percent in 1978. During the same time period utilization of rayon and acetate fibers decreased from 18.6 to 7.0 percent. The end-use of rayon and acetate fibers has remained fairly consistent since 1965 with a slight increase in the proportion being utilized by apparel and slight decreases in the proportions being utilized by home furnishings and industrial and other testile goods manufacturers. As shown in Table V-21, in 1978 apparel accounted for 35.0 percent of all rayon and acetate utilized; home furnishings, 26.7 percent; industrial and other goods; 32.7 percent; and exports 5.6 percent.

End-use utilization of non-cellulosic fibers also has remained relatively consistent since 1965. As shown in Table V-22, apparel, home furnishings, and exports have increased slightly their proportions of textile goods utilizing non-cellulosic fibers, with the industrial and other goods share decreasing. In 1978, apparel accounted for 36.4 percent of the end-use of non-cellulosic fibers; home furnishings, 34.9 percent; industrial and other goods, 25.8; and exports, 2.9 percent.

c. Finished Goods - by end-use markets

The textile fibers discussed in the preceding section are distributed into four major end-use markets: apparel, home furnishings, industrial and other consumer products, and exports. As shown in Table V-23, in 1978, 40.4 percent of all textiles were shipped as apparel; 32.2 percent were shipped as home furnishings; 23.3 percent were shipped as industrial and other consumer goods; and 4.1 percent were shipped as exports. In an effort to determine the major factors affecting consumption, DPRA has generated four functions relating income, age, employment, and housing starts to the final demand for textile end-use products. Equations 1 and 4 as shown in Table V-24, relate 1965-1977 per capita personal consumption expenditures for clothing and shoes to, first, disposal per capita income, and second, the proportion of 18-44 year-olds in the U.S. population. Each equation accounts for about 99 percent of the variation in clothing and shoe expenditures over this

Table V-19. End-use consumption summary for wool, 1965- 1978

Year	Apparel million pounds	Apparel percent	Home Furnishings million pounds	Home Furnishings percent	Industry & Other million pounds	Industry & Other percent	Exports million pounds	Exports percent	Total million pounds	Wool percent
1965	373	68.2	124	22.7	42	7.7	8	1.5		100.0
1966	358	68.1	122	23.2	40	7.6	6	1.1	526	100.0
1967	331	70.3	99	21.0	36	7.6	5	1.1	471	100.0
1968	345	71.4	98	20.3	35	7.2	5	1.0	483	100.0
1969	282	64.8	108	24.8	44	10.1	1	0.2	435	100.0
1970	218	62.3	89	25.4	42	12.0	1	0.3	350	00.0
1971	162	62.1	85	32.6	8	3.1	6	2.3	261	100.0
1972	159	56.2	89	31.4	8	2.8	27	9.5	283	100.0
1973	130	60.6	53	24.0	9	4.1	25	11.3	217	100.0
1974	90	62.1	33	21.6	10	6.5	15	9.8	148	100.0
1975	105	67.3	32	20.5	6	3.8	13	8.3	156	100.0
1976	132	73.3	33	18.3	8	4.4	7	3.9	180	100.0
1977	135	75.4	32	17.9	8	4.5	4	2.2	179	100.0
1978	144	75.0	35	18.2	9	4.7	4	2.1	192	100.0

Source: Textile Economics Bureau, Inc., Textile Organon, November, 1978.

Table V-20. End-use consumption summary for cotton, 1965-1978

Year	Apparel million pounds	Apparel percent	Home Furnishings million pounds	Home Furnishings percent	Industry & Other million pounds	Industry & Other percent	Exports million pounds	Exports percent	Total million pounds	Cotton percent
1965	1,891	42.9	1,289	29.2	1,109	25.1	121	2.8	4,410	100.0
1966	1,866	41.9	1,282	28.8	1,175	26.4	133	3.0	4,456	100.0
1967	1,691	39.7	1,294	30.4	1,150	27.0	128	3.0	4,263	100.0
1968	1,630	39.6	1,260	30.6	1,099	26.7	123	3.0	4,112	100.0
1969	1,573	39.1	1,242	30.9	1,048	26.1	159	4.0	4,022	100.0
1970	1,525	39.6	1,199	31.1	995	25.8	132	3.4	3,851	100.0
1971	1,857	47.2	1,230	31.3	696	17.7	150	3.8	3,933	100.0
1972	1,903	47.2	1,246	30.9	690	17.1	196	4.9	4,035	100.0
1973	1,762	47.1	1,092	29.2	678	17.9	220	5.9	3,752	100.0
1974	1,692	48.3	962	27.5	600	16.9	255	7.3	3,509	100.0
1975	1,561	48.4	900	27.8	528	16.5	234	7.2	3,223	100.0
1976	1,733	49.4	912	26.8	594	16.2	267	7.6	3,506	100.0
1977	1,698	50.5	891	27,3	543	15.7	221	6.5	3,353	100.0
1978	1,514	49.7	908	28.0	506	15.6	220	6.7	3,248	100.0

Source: Textile Economics Bureau, Inc., Textile Organon, November, 1978.

Table V-21. End-use consumption summary for rayon and acetate man-made fibers, 1965-1978.

Year	Apparel million pounds	Apparel percent	Home Furnishings million pounds	Home Furnishings percent	Industry & Other million pounds	Industry & Other percent	Exports million pounds	Exports percent	Total million pounds	Rayon & Acetate percent
1965	452	28.4	506	31.7	593	37.2	43	2.7	1,594	100.0
1966	455	28.2	509	31.6	604	37.4	45	2.8	1,613	100.0
1967	523	33.5	447	28.7	546	35.0	44	2.8	1,560	100.0
1968	572	33.1	499	28.9	621	35.9	37	2.1	1,729	100.0
1969	530	32.7	433	26.7	616	38.0	41	2.5	1,620	100.0
1970	473	33.3	349	24.6	556	39.2	41	2.9	1,419	100.0
1971	670	45.0	383	25.7	400	26.9	35	2.4	1,488	100.0
1972	608	43.1	332	23.5	433	30.7	37	2.6	1,410	100.0
1973	600	43.4	336	24.3	407	29.0	44	3.3	1,387	100.0
1974	430	38.1	270	23.9	378	32.7	62	5.3	1,140	100.0
1975	325	39.7	178	21.7	264	32.3	52	6.3	819	100.0
1976	308	35.4	213	24.4	297	34.1	53	6.1	871	100.0
1977	304	34.2	209	24.5	307	33.8	51	7.5	871	100.0
1978	307	35.0	234	26.7	287	32.7	49	5.6	877	100.0

Source: Textile Economics Bureau, Inc., Textile Organon, November, 1978.

Table V-22. End-use consumption summary for non-cellulosic man-made fibers, 1965-1978

Year	Apparel		Home Furnishings		Industry & Other		Exports		Total	Non
	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	Cellulosic percent
1965	692	34.1	582	28.7	720	35.5	35	1.7	2,029	100.0
1966	787	33.2	675	28.5	871	36.7	39	1.6	2,372	100.0
1967	989	36.3	792	29.1	902	33.1	42	1.5	2,725	100.0
1968	1,270	35.8	1,071	30.2	1,163	32.7	48	1.4	3,552	100.0
1969	1,200	30.9	1,259	32.4	1,362	35.1	64	1.6	3,885	100.0
1970	1,368	33.6	1,314	32.3	1,328	32.6	64	1.6	4,074	100.0
1971	1,998	40.5	1,642	33.3	1,237	25.1	60	1.2	4,937	100.0
1972	2,503	40.8	2,052	33.4	1,510	24.6	71	1.2	6,136	100.0
1973	2,831	39.6	2,450	33.9	1,766	24.6	137	1.9	7,184	100.0
1974	2,624	40.0	2,194	31.7	1,746	25.5	187	2.8	6,751	100.0
1975	2,681	41.6	2,150	32.3	1,580	23.7	160	2.5	6,571	100.0
1976	2,757	38.6	2,356	32.7	1,849	26.3	175	2.4	7,137	100.0
1977	3,027	38.0	2,681	34.8	1,992	25.1	177	2.1	7,877	100.0
1978	2,982	36.4	2,858	34.9	2,119	25.8	240	2.9	8,199	100.0

Source: Textile Economics Bureau, Inc., Textile Organon, November, 1978.

Table V-23. End-use consumption summary for all textile fibers, 1965-1978

Year	Apparel million pounds	Apparel percent	Home Furnishings million pounds	Home Furnishings percent	Industry & Other million pounds	Industry & Other percent	Exports million pounds	Exports percent	Total million pounds	All Fibers percent
1965	3,408	39.7	2,501	29.2	2,464	28.7	207	2.4	8,580	100.0
1966	3,466	38.7	2,588	28.9	2,690	30.0	223	2.5	8,967	100.0
1967	3,534	39.2	2,632	29.2	2,634	29.2	219	2.4	9,019	100.0
1968	3,817	38.6	2,928	29.6	2,918	29.5	213	2.2	9,876	100.0
1969	3,585	36.0	3,042	30.5	3,070	30.8	265	2.7	9,962	100.0
1970	3,584	37.0	2,951	30.4	2,921	30.1	238	2.5	9,694	100.0
1971	4,657	44.0	3,340	31.5	2,341	22.1	251	2.4	10,589	100.0
1972	5,173	43.6	3,719	31.3	2,641	22.3	331	2.8	11,864	100.0
1973	5,323	42.5	3,931	31.3	2,860	22.8	426	3.4	12,540	100.0
1974	4,836	41.8	3,459	30.0	2,734	23.7	519	4.5	11,549	100.0
1975	4,672	43.3	3,260	30.3	2,378	22.1	459	4.3	10,769	100.0
1976	4,930	42.2	3,514	30.6	2,748	23.5	502	4.3	11,694	100.0
1977	5,164	42.0	3,813	31.1	2,850	23.2	453	3.7	12,280	100.0
1978	5,047	40.4	4,035	32.2	2,921	23.3	513	4.1	12,516	100.0

Source: Textile Economics Bureau, Inc., Textile Organon, November, 1978.

Table V-24. Functional relationships in the end-use demand for textile goods

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Equation 1.  Per capita expenditures for clothing and shoes (in current dollars) as a function of disposable income per capita
             (in current dollars)

  dependent variable                  : clothing/shoes.  Observed mean:259.92307
  independent variable                : income.  Observed mean:      3,361.00000

  Equation 1.                           clothing/shoes               income
  R2=.996                               259.92307 = 36.09652 + .05797 (3,361.00000)

  t for Ho: parameter = 0             :                     57.11
  probability of a greater t by chance :                      .0001

  F for ind. var. SS                  :                              3,261.21
  probability of a greater F by chance :                                 .0001

Equation 2.  Title: Per capita consumption of carpets (in pounds) as a function of total employment (in 1,000 persons) and of
             private housing starts (in 1,000 units)

  dependent variable                  : carpets.  Observed mean:          6.84615
  independent variable                : employment.  Observed mean:   80,511.92307
  independent variable                : housing.  Observed mean:       1,601.00000

  Equation 2.                           carpets                      employment                  housing
  R2=.957                               6.84615 = -16.13253 + .00025 (80,511.92307) + .00166 (1,601.00000)

  t for Ho: parameter = 0             :                     11.61                   5.01
  probability of a greater t by chance :                      .0001                  .0005

  F for ind. var. SS                  :                              197.61                  25.10
  probability of a greater F by chance :                                .0001                  .0005

Equation 3.  Title: Per capita consumption of home furnishings (in pounds) as a function of total employment (in 1,000 persons)
             and of private housing starts (in 1,000 units)

  dependent variable                  : furnishings.  Observed mean:     15.51538
  independent variable                : employment.  Observed mean:   80,511.92307
  independent variable                : housing.  Observed mean:       1,601.00000

  Equation 3.                           furnishings                  employment                  housing
  R2=.947                               15.51538 = -5.24387 + .00020 (80,511.92307) + .00267 (1,601.00000)

  t for Ho: parameter = 0             :                      8.34                   7.12
  probability of a greater t by chance :                      .0001                  .0001

  F for ind. var. SS                  :                              127.86                  50.65
  probability of a greater F by chance :                                .0001                  .0001

Equation 4.  Title: Per capita expenditures for clothing and shoes (in current dollars) as a function of the proportion of
             18-44 year-old persons in the U.S. population

  dependent variable                  : clothing/shoes.  Observed mean:  259.92307
  independent variable                : age structure.  Observed mean:      .36392

  Equation 4.                           clothing/shoes                       age structure
  R2=.989                               259.92307 = -1,316.64939 + 4,332.15856 (.36392)

  t for Ho: parameter = 0             :                              32.60
  probability of a greater t by chance :                               .0001

  F for ind. var. SS                  :                                   1,062.51
  probability of a greater F by chance :                                      .0001
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Source: Development Planning and Research Associates, Inc.

period. Expenditure elasticities 1/ associated with these independent variables are 0.86 for income and 6.07 for age structure. Equation 2 relates the per capita consumption of carpets to total employment and to private housing starts. The two independent variables, acting jointly, account for about 96 percent of the annual variation in carpet consumption over the 1965-1977 period. Consumption elasticities are approximately 2.94 for total employment and 0.39 for private housing starts. Equation 3 relates the per capita consumption of all home furnishings to employment and housing starts. The two independent variables, acting jointly, account for about 95 percent of the annual variation in the consumption of home furnishings over the 1965-1977 period. Consumption elasticities are approximately 1.04 for total employment and 0.28 for private housing starts. Standard errors associated with regression parameters ranged between 2 and 20 percent of these parameters where only one standard error was greater than 14 percent of its parameter. The statistical results require interpretative care, but they support the findings of earlier researchers.

In addition to a quantitative analysis relating consumption to specific consumer characteristics, trends within end-use markets also depict demand for individual textile subsegments. These trends are discussed below.

Apparel. The quantity of textile fabric utilized for apparel increased from 3,408 million pounds in 1965 to 5,047 million pounds in 1978. The composition of apparel fabric has changed considerably since 1965, when cotton accounted for 55.5 percent of all apparel fabrics; wool, 10.9 percent; and man-made fabrics, 33.6 percent (Table V-25). The trend has been away from wool, cotton, and rayon and acetate use to non-cellulosic fabrics. In 1978, non-cellulosic fabrics represented 59.0 percent of total apparel fabrics compared to 20.3 percent in 1965. Other fibers' proportions in 1978 included cotton with 32.0 percent, wool with 2.9 percent, and rayon and acetate with 6.1 percent.

Home furnishings. As was shown in Table V-23, the home furnishing market for textiles has grown from 2.5 billion pounds of textile fibers in 1965 to over 4.0 billion pounds in 1978. With regards to the composition of the textile fabrics in this end-use market, the home furnishings market has experienced trends very similar to those of apparel fabrics. As shown in Table V-26, in 1965 over 51 percent of all home furnishings fabrics were

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1/ These and subsequent elasticities have been estimated using a procedure suggested by Pindyck and Rubinfeld (p. 72). The results must be interpreted with some care. First, the elasticities as derived are point elasticities, valid at the mean points of the independent variables. For linear regression equations of the type derived, mean point elasticities do not accurately depict the situation away from the means and toward the extremities of the observed data. Second, where numerous independent variables are acting jointly and interdependently on the dependent variable, as is the case in textile goods, the effect of one variable should not be considered without also considering the jointly-acting effects of other variables.

Table V-25. Apparel fabric consumption by fiber type, 1965-1978.

					Man - Made				Total Fabric for Apparel	
	Cotton		Wool		Rayon and Acetate		Non-Cellulosics			
Year	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent
1965	1,891	55.5	373	10.9	452	13.3	692	20.3	3,408	100.0
1966	1,866	53.8	358	10.3	455	13.1	787	22.8	3,466	100.0
1967	1,691	47.8	331	9.4	523	14.8	989	28.0	3,534	100.0
1968	1,630	42.7	345	9.0	572	15.0	1,270	33.3	3,817	100.0
1969	1,573	43.9	282	7.9	530	14.8	1,200	33.5	3,585	100.0
1970	1,525	42.6	218	6.0	473	13.2	1,368	38.2	3,584	100.0
1971	1,827	39.2	162	3.5	670	14.4	1,998	42.9	4,657	100.0
1972	1,903	36.8	159	3.1	608	11.8	2,503	48.4	5,173	100.0
1973	1,762	33.1	130	2.4	600	11.3	2,831	53.2	5,323	100.0
1974	1,692	35.0	90	1.9	430	8.9	2,624	54.2	4,836	100.0
1975	1,561	33.4	105	2.2	325	7.0	2,681	57.4	4,672	100.0
1976	1.733	35.2	132	2.7	308	6.2	2,757	55.9	4,930	100.0
1977	1,698	32.9	135	2.6	304	5.9	3,027	58.6	5,164	100.0
1978	1,614	32.0	144	2.9	307	6.1	2,982	59.0	5,047	100.0

Source: Textile Economic Bureau, Inc., Textile Organon, November, 1978.

Table V-26. Home furnishing fabric consumption by fiber type, 1965-1978.

Year	Cotton		Wool		Man - Made				Total Fabric for Home Furnishing	
					Rayon and Acetate		Non Cellulosics			
	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent
1965	1,289	51.5	124	5.0	506	20.2	582	23.3	2,501	100.0
1966	1,282	49.5	122	4.7	509	19.7	675	26.1	2,588	100.0
1967	1,294	49.2	99	3.8	447	17.0	792	30.0	2,632	100.0
1968	1,260	43.0	98	3.3	499	17.0	1,071	36.6	2,928	100.0
1969	1,242	40.8	108	3.6	433	14.2	1,259	41.4	3,042	100.0
1970	1,199	40.6	89	3.0	349	11.8	1,314	44.5	2,951	100.0
1971	1,230	36.8	85	2.5	383	11.5	1,642	49.2	3,340	100.0
1972	1,246	33.5	89	2.4	332	8.9	2,052	55.2	3,719	100.0
1973	1,092	27.8	53	1.4	336	8.5	2,450	62.4	3,931	100.0
1974	962	27.8	33	1.0	270	7.8	2,194	63.4	3,459	100.0
1975	900	27.6	32	1.0	178	5.5	2,150	65.9	3,260	100.0
1976	912	26.0	33	0.9	213	6.1	2,356	67.0	3,514	100.0
1977	891	23.4	32	0.9	209	5.5	2,681	70.3	3,813	100.0
1978	908	22.5	35	0.9	234	5.8	2,858	70.8	4,035	100.0

Source: Textile Economic Bureau, Inc., Textile Organon.

cotton; however, by 1978, cotton's share had declined to less than 23 percent. Usage of wool and rayon and acetate also declined in the home furnishings market as was also the case for the apparel market. In 1965, wool fabrics represented 5.0 percent of all fabrics used in home furnishings; by 1978 this percentage had declined to 0.9 percent. Usage of rayon and acetate declined from 20.2 percent of all home furnishings fabrics in 1965 to 5.8 percent in 1978. Similar to the trends in apparel fabric composition, man-made non-cellulosic fabrics have become the major fabric utilized in the home furnishings market, accounting for 70.8 percent of all home furnishings fabrics in 1978, up from 23.3 percent in 1965.

Industrial and other consumer goods. The quantity of demand for industrial and other consumer textile products, such as linings, shoes and slippers, luggage and handbags, toys, and medical surgical and sanitary supplies, has changed very little between 1965 and 1978, with total fabric utilized varying between 2.5 and 3.0 billion pounds annually (Table V-23). As in the case of both the apparel market and the home furnishings market, the composition of fabrics utilized in the industrial and other consumer goods markets has shifted from a heavy use of cotton (45.0 percent in 1965) to a high proportion of non-cellulosic fabric (72.6 percent in 1978). The historical data for cotton, wool and man-made fabrics utilized in industrial and other consumer textile goods are presented in Table V-27.

Exports. Exports of textiles have increased steadily since 1965, with total textile exports increasing from 207 million pounds in 1965 to 513 million pounds in 1978. As shown in Table V-28, the majority of the 1978 textile exports were non-cellulosic (46.7 percent of total textile exports), followed by cotton material (42.9 percent), rayon and acetate materials (9.6 percent), and wool (0.8 percent). Since 1965, cotton has consistently accounted for 50 percent or more of the total textile exports (except in 1974 when cotton goods accounted for 49.1 percent of the total), until 1977 and 1978, when cotton exports dipped to 49 and 43 percent, below non-cellulosic exports for the first time in 1978. Wool exports have fluctuated from year to year but usually have represented 2 to 3 percent of the total annual textile exports. Past exports of man-made materials have varied over time depending on the fiber type. Basically, exports of rayon and acetate decreased while exports of non-cellulosic materials increased.

The raw fiber equivalents of exports of wool, cotton, and man-made textile materials are depicted in Table V-29, illustrating the major form of each respective fibers' exports. As shown in the table, for wool, most wool exported in recent years has been in the form of tops and yarns and manufactured products. Combined, these forms of wool exports accounted for 82 percent of all wool exports in 1979.

For exports of cotton, most are either in the form of cotton cloth (55.9 percent of 1978 exports) or manufactured cotton products (37.0 percent).

Table V-27. Industrial and other fabric consumptions by fiber type, 1965-1978

	Cotton		Wool		Man - Made				Total Fabric for Industry and Other	
					Rayon and Acetate		Non Cellulosics			
Year	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent
1965	1,109	45.0	42	1.7	593	24.1	720	29.2	2,464	100.0
1966	1,175	43.7	40	1.5	604	22.5	871	32.4	2,690	100.0
1967	1,150	43.7	36	1.4	546	20.7	902	34.2	2,634	100.0
1968	1,099	37.7	35	1.2	621	21.3	1,163	39.9	2,918	100.0
1969	1,048	34.1	44	1.4	616	20.1	1,362	44.4	3,070	100.0
1970	995	34.1	42	1.4	556	19.0	1,328	45.5	2,921	100.0
1971	696	29.7	8	0.3	400	17.1	1,237	52.8	2,341	100.0
1972	690	26.1	8	0.3	433	16.4	1,510	57.2	2,641	100.0
1973	678	23.7	9	0.3	407	14.2	1,766	61.8	2,860	100.0
1974	600	21.9	10	0.4	378	13.8	1,746	63.9	2,734	100.0
1975	528	22.2	6	0.3	264	11.1	1,580	66.4	2,378	100.0
1976	594	21.6	8	0.3	297	10.8	1,849	67.3	2,748	100.0
1977	543	19.1	8	0.3	307	10.8	1,992	69.8	2,850	100.0
1978	506	17.3	9	0.3	287	9.8	2,119	72.6	2,921	100.0

Source: Textile Economic Bureau, Inc., Textile Organon, November, 1978.

Table V-28. Export fabric consumption by fiber type, 1965-1978

					Man - Made					
	Cotton		Wool		Rayon and Acetate		Non Cellulosics		Total Fabric for Exports	
Year	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent	million pounds	percent
1965	121	58.5	8	3.9	43	20.8	35	16.9	207	100.0
1966	133	59.6	6	2.7	45	20.2	39	17.5	223	100.0
1967	128	58.4	5	2.3	44	20.1	42	19.2	219	100.0
1968	123	57.7	5	2.3	37	17.4	48	22.5	213	100.0
1969	159	60.0	1	0.4	41	15.5	64	24.2	265	100.0
1970	132	55.5	1	0.4	41	17.2	64	26.9	238	100.0
1971	150	59.8	6	2.4	35	13.9	60	23.9	251	100.0
1972	196	59.2	27	8.2	37	11.2	71	21.5	331	100.0
1973	220	51.6	25	5.9	44	10.3	137	32.2	426	100.0
1974	255	49.1	15	2.9	62	11.9	187	36.1	519	100.0
1975	234	51.0	13	2.8	52	11.3	160	34.9	459	100.0
1976	267	53.2	7	1.4	53	10.6	175	34.8	502	100.0
1977	221	48.8	4	0.9	51	11.3	177	39.0	453	100.0
1978	220	42.9	4	0.8	49	9.6	240	46.7	513	100.0

Source: Textile Economic Bureau, Inc., Textile Organon, November, 1978.

The various forms of man-made fiber textile materials' exports are also shown in Table V-29. As shown, most man-made textile exports are either cloth and fabric or man-made fiber manufactured products. In 1979, these two forms represented 52.9 and 37.7 percent, respectively, of all man-made textile material exports.

B. Price Determination

Segments within the textile industry are highly competitive with prices of its output determined through the direct and indirect interaction of many variables. Although textile demand has been strong during recent years, certain segments have operated with excess supply capacity resulting in lower capacity utilization rates generally ranging from 60 to 80 percent. Furthermore, increasing levels of imports have added to the available supplies of certain textile goods. These factors plus consumer attitudes and spending habits influence prices received for textile goods.

In this section, the textile price determination process is described. Included in the discussion are descriptions of the major price influencing factors and historical trends in textile prices.

1. The Price Determination Process and Influencing Factors

The textile industry's pricing process, at one time, could be depicted as the closest model of pure competition existing in the major manufacturing industries in the U.S. However, during the past two to three decades, the competitive environment has changed and accordingly the applicability of pure competitive situations have been reduced 1/.

While the available supply and market demand for specific textile goods are major determinants of the price of the goods, numerous other factors have considerable influence in the actual price received by the textile manufacturers. These are described below.

(1) Characteristics of the product: its seasonal, cyclical, and secular demand; breadth of market; i.e., degree to which it is multipurpose; nature of styling and operation where styled.
(2) Elasticity of supply: extent to which machinery can be transferred into and out of the market; policy of shift operation; industry practice concerning goods in process and finished inventories: are goods made to stock, on order only, or are goods made and sold at the market almost regardless of price?
(3) Extent of producer specialization by produce and by market level. Degree of inertia among producers and respect to changes in product construction.

1/ Georgia Institute of Technology, Economic Analysis of Pretreatment Standards for the Textile Industry, for the U.S. Environmental Protection Agency, July, 1977.

Table V-29. Raw wool equivalent of U.S. exports of wool products, 1965-1979

Year	Tops and Yarns		Woven Fabrics		Manufactured Products		Noils & Wastes		Carpets & Rugs		Total	
	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent
1965	618	4.0	804	5.1	4,740	30.3	8,876	56.7	614	3.9	15,652	100.0
1966	730	5.8	586	4.6	4,388	34.6	6,399	50.4	588	4.6	12,691	100.0
1967	858	9.9	550	6.4	3,431	39.7	3,293	38.1	509	5.9	8,641	100.0
1968	828	8.9	496	5.3	3,562	38.1	3,635	38.9	818	8.8	9,339	100.0
1969	1,132	12.7	395	4.4	2,676	30.1	3,686	41.4	1,004	11.3	8,893	100.0
1970	1,101	16.1	403	5.9	1,982	28.9	2,484	36.3	881	12.9	6,851	100.0
1971	5,414	44.9	469	3.9	2,342	19.4	2,616	21.7	1,205	10.0	12,046	100.0
1972	26,111	78.3	599	1.8	2,804	8.4	2,753	8.3	1,065	3.2	33,332	100.0
1973	23,468	70.3	1,069	3.2	4,241	12.7	2,601	7.8	1,984	5.9	33,363	100.0
1974	14,226	54.0	922	3.5	5,702	21.7	2,978	11.3	2,504	9.5	26,332	100.0
1975	11,823	55.3	1,293	6.0	4,203	19.7	2,186	10.2	1,880	8.8	21,385	100.0
1976	5,728	37.8	955	6.3	4,929	32.6	1,277	8.4	2,261	14.9	15,150	100.0
1977	3,176	24.4	878	6.7	5,407	41.5	1,591	12.2	1,986	15.2	13,038	100.0
1978	2,565	20.4	1,094	8.7	7,246	57.7	929	7.4	733	5.8	12,567	100.0
1979	4,164	27.3	1,162	7.6	8,286	54.4	1,323	8.7	297	2.0	15,232	100.0

Raw cotton equivalent of U.S. cotton exports, 1965-1979

Year	Yarn		Thread and Twine		Cloth		Manufactured Cotton Products		Total	
	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent
1965	7,104	4.1	3,069	1.8	110,301	63.5	53,258	30.6	173,732	100.0
1966	6,518	3.4	3,352	1.8	122,843	64.8	56,813	30.0	189,526	100.0
1967	5,737	3.0	3,148	1.7	119,797	63.6	59,717	31.7	188,399	100.0
1968	4,442	2.4	3,218	1.7	115,202	61.2	65,338	34.7	188,200	100.0
1969	37,432	16.1	3,014	1.3	118,171	50.9	73,446	31.6	232,063	100.0
1970	15,180	7.6	2,562	1.3	113,932	57.2	67,512	33.9	199,186	100.0
1971	16,245	7.2	2,964	1.3	130,841	57.8	76,261	33.7	226,311	100.0
1972	17,875	6.2	4,043	1.4	174,482	60.0	94,044	32.4	290,444	100.0
1973	15,372	4.8	5,293	1.6	199,825	61.4	104,707	32.2	325,197	100.0
1974	17,926	4.6	6,087	1.6	228,024	58.5	137,381	35.3	389,418	100.0
1975	11,958	3.4	5,038	1.4	217,388	61.5	119,270	33.7	353,654	100.0
1976	12,160	2.9	6,318	1.5	248,391	60.2	146,285	35.4	413,154	100.0
1977	10,150	2.8	6,733	1.8	203,981	55.2	148,598	40.2	369,462	100.0
1978	20,340	5.7	11,627	3.3	187,779	61.8	135.980	38.2	355,745	100.0
1979	28,262	5.9	5,883	1.2	267,134	55.9	176,687	37.0	477,966	100.0

Man-made fiber equivalent of U.S. exports of man-made textile products, 1965-1979

Year	Sliver, tops, and roving		Yarn & Thread		Cloth & Fabric		Man-Made Fiber Manufactured Products		Total	
	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent	1,000 pounds	percent
1965	4,809	3.7	2,815	2.2	87,721	68.0	33,711	26.1	129,056	100.0
1966	6,384	4.6	2.009	1.4	93,121	66.5	38,462	27.5	139,976	100.0
1967	4,500	3.4	2,606	2.0	84,218	63.3	41,654	31.3	132,978	100.0
1968	5,042	3.9	3,412	2.6	75,166	58.3	45,374	35.2	128,994	100.0
1969	6,002	4.1	5,969	4.0	79,345	54.3	54,914	37.6	146,230	100.0
1970	5,644	3.8	6,171	4.2	76,404	52.0	58,833	40.0	147,052	100.0
1971	4,541	3.1	5,849	4.0	70,186	47.9	66,101	45.0	146,677	100.0
1972	5,142	2.9	7,479	4.2	83,681	47.1	81,282	45.8	177,584	100.0
1973	10,653	3.7	23,459	8.2	128,628	44.6	125,587	43.5	288,227	100.0
1974	13,381	3.4	34,222	8.8	176,505	45.2	166,626	42.6	390,734	100.0
1975	6,777	2.1	20,934	6.5	160,627	49.8	134,050	41.6	322,388	100.0
1976	12,254	3.5	24,666	7.0	154,007	46.8	150,249	42.7	352,176	100.0
1977	12,124	3.3	27,396	7.5	166,819	45.4	160,737	43.8	367,076	100.0
1978	10.147	2.3	27.559	6.2	229.569	52.0	174.423	39.5	441.700	100.0
1979	13,252	2.2	42,549	7.1	315,542	52.9	225,140	37.7	596,583	100.0

Source: U.S. Department of Agriculture, Cotton and Wool Situation, Februray 1979.

(4) Degree of uniformity in the offerings of different producers. (This is not so much a question of knowing what mills produce the best or poorest qualities as the extent of variation vs. homogeneity of products).

(5) Number and relative size of sellers in the market; extent and character of price leadership.

(6) Procedures by which sellers claim to arrive at selling prices; attention given to market information, probable action of competitors, statistical appraisal of market prospects, own costs, etc.

(7) Number and relative size of buyers in the market; extent and character of their domination of the market; procedures by which they claim to arrive at prices they will pay.

For most textile facilities, the initial basis for determining prices of their products is the same as for most products; the manufacturer attempts to recover his raw material and production costs plus a margin of profit. With this information plus consideration of the market environment and other influencing factors, the manufacturers usually either chooses a simple formula in setting prices such as costs + overhead + fair profit = price, or charges what the market will bear. In setting prices, manufacturers sometimes attempt to penetrate a market through low prices, possibly sacrificing profits and selling at or below costs to attract a following, or they may want to set prices extremely high in order to establish it as a high quality, expensive item. For example, DuPont charged the maximum amount possible for Qiana, a silk-like fabric, when the product was initially introduced, in the hope that consumers would associate the fabric with high fashion. To accomplish this, DuPont charged high prices--$5.95 to $8.95 per pound compared with a market price of $8 to $10 per pound for silk. The appetite of lower-priced fashion markets has now been whetted and the company plans to broaden its coverage by dropping to the next lowest price category as promotion and production costs continue to drop 1/. When analyzing the consumer, manufacturers must determine whether the customer is willing to pay more to maintain or increase quality or if he will sacrifice quality for quantity.

As will be presented in the next section, prices of textile goods have varied during recent years with most, if not all, increasing when expressed in current dollars (not adjusted for inflation). These price changes are a result of various factors, the most common being changes in the prices or costs of the various components comprising the finished product. As was shown in Exhibit IV-1 (page IV-19), textile manufacturing represents just one of many manufacturing steps involved in converting chemical or agricultural

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1/ "Pricing Strategy in an Inflation Economy", Business Week. Reprinted by Vernon, Ivan R. and Charles W. Lamb, Jr., ed. The Pricing Function, Lexington, Mass.: Lexington Books, 1976, 43.

products (fibers) into consumer textile goods available at retail stores. To gain a perspective of the respective shares of the retail dollar of textile goods, Edward H. Glade, Jr., estimated the distribution of the consumers' retail dollar spent for cotton denim dungarees. In this estimate, the costs of producing, ginning, marketing and processing raw cotton and manufacturing and distributing cotton products were included in the dollar spent, as were retail displaying and merchandising. This distribution is presented in Table V-30. As shown, of the $8 retail value of a pair of cotton denim dungarees in 1974, 6.4 percent of this price was associated with the farm production of cotton, 2.0 percent was associated with ginning and marketing to the textile mills, 19.6 percent was associated with the textile mill processing and finishing, 30.0 percent was associated with apparel manufacturing, and 42.0 percent was associated with wholesaling and retailing.

2. Prices and Marketing Patterns

As a means of illustrating price trends and relationships, textile products were grouped according to marketing patterns, as listed below. Fibers are comprised of both plant fiber and animal hair produced on the farm, and synthetic fibers produced primarily in the chemical industry.

(a) Fibers
(b) Yarn
(c) Fabrics
(d) Carpets
(e) Apparel
(f) Home furnishings

Yarn, fabrics and carpets are manufactured almost entirely within the textile industry. Yarn is produced exclusively in the industry and constitutes an intermediate product, while fabrics and carpets may be either intermediate or final products. Apparel and home furnishings are final products which may be produced within the industry or within other industries. In Table V-31, additional groupings are shown for each of the major classifications. These major groupings include specific products to be discussed below for which commodity prices can be identified.

In Chapter IV, the broad relationships between the major markets involved were illustrated in Exhibit IV-1. More specific relationships are shown in Exhibit V-1 in this chapter in order to indicate at what point in the production flow products may appear in each of the markets. These markets show the relationships between mills falling within the classification system of the industry as covered subsequently in the study.

As pointed out above, the fiber markets provide the raw material input to the textile industry. This input includes not only cotton, wool and synthetic staple and tow but also unprocessed filament yarns. In the production flow, fiber may appear as processed yarn produced in the yarn mills

Table V-30. Cotton denim dungarees: estimated distribution of the retail dollar by operation or service, 1974 1/

Operation or Service	Cost per pound of cotton[2]		Cost per pair produced[3]		Proportion of retail dollar	
		Dollars		*Dollars*		*Dollars*
Farm production		.366		.516		6.4
Ginning		.061		.086		1.1
Marketing to textile mills		.052		.073		0.9
Warehousing services	(.010)		(0.14)		(0.2)	
Compression	(.008)		(.011)		(0.1)	
Transportation	(.014)		(.020)		(0.3)	
All other [4]	(.020)		(.028)		(0.3)	
(Accumulated value at mill door)		(.479)		(.675)		(8.4)
Textile mill processing and finishing		1.115		1.572		19.6
(Accumulated value after textile mill)		(1.594)		(2.247)		(28.0)
Apparel manufacturing		1.715		2.418		30.0
(Accumulated value after manufacturing		(3.309)		(4.665)		(58.0)
Wholesaling-retailing		2.390		3.370		42.0
Total value at retail		5.699		8.035		100.0

[1] Estimates were developed from both published and unpublished sources. Farm production, ginning, and marketing costs are U.S. Department of Agriculture data; textile mill processing and apparel manufacturing estimates were adapted from data from the Bureau of Labor Statistics; and Wholesaling-retailing margins estimated from private trade sources. Complete methodology and data sources are available on request. [2] These data represent the estimated cost or value added to 1-pound of cotton at each stage from production through retailing for cotton used in the manufacture of men's cotton denim dungarees. [3] Costs per pair produced reflects the estimated cost or value added to a typical pair of denim dungarees containing 1.41 pounds of cotton (2.256 sq. yds. x .625 pounds per sq. yd.) at each stage from production through retailing. [4] Includes buying and selling expenses, cotton insurance, financing, and overhead expenses of marketing firms.

Source: Glade, Edward H., Jr. "Who Gets the Cotton Denim Dollar?" Cotton and Wool Situation, USDA, March 1976, 30-32.

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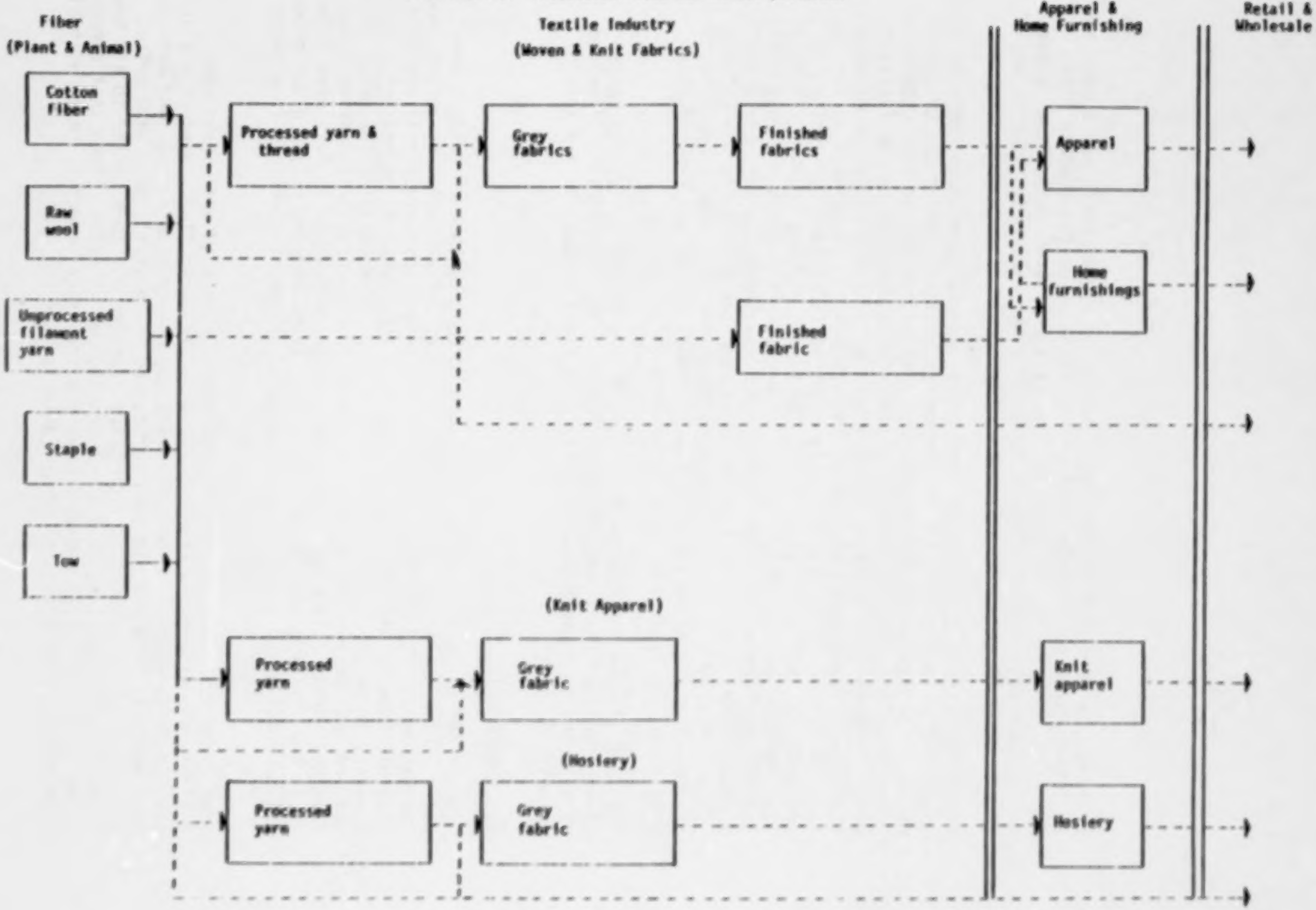
Table V-31. The textile industry - major product groupings

Fibers	Processed Yarn	Fabric	Apparel	Textile Homefurnishings	Floor Covering
Plant fiber and Animal hair Cotton Wool Synthetic Fiber Unprocessed filament yarn Staple Tow	Processed yarn Cotton Wool Synthetic Blends Thread Cotton Synthetic	Gray fabric Broad woven Cotton Synthetic Blends Knit Synthetic blends Finished fabric Broad woven Cotton Wool Synthetic Blends Knit Synthetic Blends Wool	Womens Coats and suits Dresses Knit Woven Underwear Hosiery Mens Suits and coats Woven Knit Trousers Knit Woven Shirts Woven Knit Underwear Hosiery	Sheets Cotton Towels Cotton Blankets Wool Synthetic	Carpets Tufted Woven Wool Synthetic

Source: Development Planning and Research Associates, Inc.

Exhibit V-1. Production flows and market patterns.


Fiber
(Plant & Animal)
Textile Industry
(Woven & Knit Fabrics)
Apparel &
Home Furnishing
Retail &
Wholesale
Cotton fiber
Raw wool
Unprocessed filament yarn
Staple
Tow
Processed yarn & thread
Grey fabrics
Finished fabrics
Finished fabric
Apparel
Home furnishings
(Knit Apparel)
Processed yarn
Grey fabric
Knit apparel
(Hosiery)
Processed yarn
Grey fabric
Hosiery

Source: Development Planning and Research Associates, Inc.

or it may be consumed in weaving, knitting or carpet mills and appear as an intermediate or final product at any stage along the product flow. For example, fiber is consumed in some cases by large integrated carpet mills, however, carpets produced from the fiber will not appear in any market prior to the floor covering market.

Within the fabric system, yarn from the processed yarn markets may be consumed either by greige mills or integrated mills. If consumed by greige mills, it may appear along the product flow in the greige fabric markets where it will be an intermediate product to be consumed by the finishing mills. However, it may also next appear on the finished fabric markets if the fabric is processed through a commission mill. Another flow for the yarn is through integrated mills in which it is milled into greige fabric and then finished prior to entering the finished fabric market. A third flow for the yarn is through a full integrated mill which not only mills and finishes fabric but also fabricates final products, e.g. mills which produce sheets. In this case, products from the yarn would not enter a market prior to the textile home furnishing market. Fabric appearing on the finished fabric market is a final product to the textile industry exiting to the apparel or home furnishing industry.

The flow of yarn through the knit apparel and hosiery mills can be as diverse as the flow involving woven fabric. The significant difference is that the finished product appears as a final product on the apparel market.

3. Raw Material Prices

Sources for price information vary considerably by type of product produced. USDA publishes detailed data on fiber prices including cotton, wool, and man-made. BLS publishes monthly spot prices on textile mill products, apparel, home furnishings and carpets in its Producer Price and Price Indexes. However, these prices are obtained as a means of developing the price indexes and are not intended to be used in developing specific price series. Hence, from this data, only a few significant price series can be developed. The Daily News Records reports spot prices on yarn, cotton, cotton group goods, and man-made group goods. A discussion of the prices provided from these sources is contained below.

Wool (from USDA source). Prices for fine U.S. graded wool paralleled Australian wool closely through 1972 with 3/8 blood fleece wool at a slight quality differential. A 50 cent price gap opened between U.S. and Australian fine wools in 1973 and has been maintained since that time. Wool prices hit a low in 1971 resulting from heavy supplies but then cycled to all time highs in 1973 resulting from shortages induced in 1971. Since that erratic swing in the 1972-1973 cycle, however, prices have tended to be more stable over the past few years, as shown in Table V-32.

Table V-32. Wool and cotton prices: current dollars, 1965-1979

Year	Raw wool, clean basis, Boston: Good French Combing & Staple: Graded territory fine	Raw wool, clean basis, Boston: Good French Combing & Staple: Graded fleece 3/8 blood	Raw wool, clean basis, Boston: Australian 64's, warp and half warp	Cotton prices: Received by farmers (Am. upland)	Cotton prices: SLM grade 41, staple 34, 10 market
	--------------dollars per pound---------------			--------cents per pound---------	
1965	1.2	1.2	1.2	28.0	29.5
1966	1.3	1.2	1.2	20.6	22.8
1967	1.2	.9	1.1	25.4	28.8
1968	1.2	.8	1.2	22.0	24.5
1969	1.2	.9	1.2	20.9	23.1
1970	1.0	.9	.9	21.9	24.3
1971	.7	.6	.8	28.1	33.0
1972	1.2	.9	1.3	27.2	35.6
1973	2.5	1.6	3.0	44.4	67.1
1974	1.8	1.5	2.2	42.8	41.2
1975	1.5	1.2	2.1	51.1	58.0
1976	1.8	1.7	2.2	64.7	73.4
1977	1.8	1.8	2.3	51.8	50.8
1978	1.9	1.8	2.3	58.5	61.6
1979	2.2	na	2.8	57.5	61.6

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Business Statistics, 1975, 1977, 1979, and Survey of Current Business, May, 1980.

Cotton (from USDA sources). Cotton prices paid to farmers and cotton prices on the market have fluctuated dramatically over the past decade. Cotton suffered its greatest loss in its share of the market in 1968 when a short supply in 1967 caused high prices, spurring many mills to shift over to man-made fibers. This fluctuation was minor, though, when compared to the period between 1972 and 1978 (Table V-32). Market prices jumped from 35.6 cents in 1972 to 67.1 cents per pound in 1973 and then fell to 41.2 cents in 1974. Prices began climbing again and reached 73.4 cents in 1976 and then fell to 50.8 cents in 1977, increasing to 61.6 percent in 1979. The differences in market prices and prices paid to farmers were also erratic during the 1972 to 1978 period. Prior to 1970, the difference between the two prices varied by only a couple of cents; in 1972 they widened to almost 5 cents. The gap continued widening until 1973, when the market price was almost 23 cents higher per pound than farmers received. The market price fell in 1974, however, declining below the price received by farmers. The market price fell below that received by farmers, again, in 1978.

Man-made fibers (from USDA sources). Consumption of man-made fibers has risen dramatically over the past decade. This growth corresponds with the long-run trend of downward prices of man-made fibers. The man-made fiber prices have fallen primarily due to greater efficiency within the industry. Although prices for all synthetic fibers have declined since the Korean War, the non-cellulosic fibers have fallen the most and cellulosic fibers the least. Another characteristic of man-made fibers is the consistency of prices throughout time and among producing companies, for all types of material. The price is typically steady for long periods of time, usually, when one company raises or lowers a price, the others follow. A third characteristic of man-made fiber pricing is discounting. Although list prices are known, market sales are often contracted at lower levels and man-made fiber buyers receive trade discounts of five to 15 percent 1/. The main types of discounts offered include offering a percentage off for volume purchases and arranging promotion sharing and other inducements.

Polyester fibers have declined dramatically in price, dropping from 86 cents per pound in 1965 to 35 cents in 1972. Since that time, prices have increased to 60 cents per pound in 1979 (Table V-33).

Rayon staple, which was priced lower than polyester in 1965, maintained a constant price through 1971 while polyester declined dramatically. Both have increased in price with rayon increasing at a faster rate. In 1979 rayon was priced at 65 cents a pound, 5 cents higher than polyester.

1/ Ward, Lionel E. Interfiber Competition with Emphasis on Cotton, unpublished Ph.D. dissertation, University of California, Davis. Available through University Microfilm International 1962, p. 37 and Economic Research Service, U.S. Textile Fiber Demand, USDA Bulletin No. 1500, Washington D.C., September 1974, p. 22.

Table V-33. Landed group B mill points: man-made staple fiber prices at f.o.b. producing plants current dollars. 1965-1979

Year	Rayon[1]	Polyester[2]
1965	27	85
1966	26	80
1967	24	62
1968	25	56
1969	26	45
1970	25	41
1971	27	37
1972	31	35
1973	33	37
1974	51	46
1975	51	48
1976	54	53
1977	58	56
1978	58	54
1979	65	60

[1] 1.5 and 3.0 denier, regular rayon staple.

[2] Reported average market price for 1.5 denier polyester staple for cotton blending.

Source: U.S. Department of Agriculture, Cotton Situation.

Fiber price comparison. While individual fiber price movements are important, these price changes become even more significant when one fiber is compared with a substitute fiber. These price relationships are a key factor in determining the type of fiber and type of blends that will be used in the manufacturing process. Two basic price ratios are shown in Table V-34: wool/polyester and cotton/polyester.

The wool/polyester price ratio has changed dramatically over the past with wool becoming increasingly disadvantageous with respect to polyester. In 1965 the ratio was 1.4 to 1 but it increased steadily to 1971 with sharp increases in 1972 to 3.4 to 1 and reached a peak of 6.8 to 1 in 1973. Since that time the ratio has become somewhat more favorable to wool with a ratio of 3.5 to 1 in 1978.

The cotton to polyester price ratio followed a similar pattern but not as dramatic. Cotton had a distinct advantage in 1965 with a price ratio of 0.4 to 1. By 1971 the ratio changed to a 0.9 to 1 relationship as cotton prices increased. In 1973, the rate hit a peak of 1.8 to 1 and has fluctuated between 1.2 and 0.9 to 1 since then.

The determinants of the demand for fibers, factors affecting fiber substitution, and interfiber competition have been studied by a variety of authors (Blakeley, 1962; Ward, 1969; Barlowe and Donald, 1971; Evans, April and September, 1977). In general, fiber demand is determined by price effects, trend effects, and the relative stability of fiber supply. Both own-price and cross-price 1/ effects are important. Most writers have found significantly larger cross-price effects than own-price effects, especially for cotton (Evans, September, 1977; Ward, 1969). Long term trends in relative prices have been very significant, but fiber markets have not quickly responded to short term changes in relative prices (Ward, 1969). While quantitative analysis has usually demonstrated these price effects, virtually all writers have maintained that trend variables are at least as important as prices in the determination of fiber market shares (Ward, 1979; Barlowe and Donald, 1971; Evans, April 1977; Ga. Tech, 1977). The term "trend" groups effects from technological change, market inertia,tastes and preferences, market promotion, and research. Technological developments, most of which have favored non-cellulosic synthetics, include the discovery of new uses, new products, and new materials; developments in blending, weaving, and dyeing; technical and quality fabric characteristics; and machinery capacities and speeds. Market inertia includes factors related to the momentum of buying habits, the level of fiber consumption in previous periods, types and capacities of installed machinery, the reluctance to change fibers in current use, and the finality of a change in fiber mix once that change is effected. Fashion, style, comfort, fabric performance characteristics, advertising and market promotion, and research on new materials and uses are also important. Finally, supply stability is a positive factor

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1/ Cross-price effects refer to the effects on a product induced by changes in the prices of that product's substitutes (competitors).

Table V-34. Price ratios of wool to polyester and cotton to polyester, 1965-1978

Year	Wool	Polyester	Ratio	Cotton	Polyester	Ratio
1965	1.20	.85	1.4:1	.30	.85	.4:1
1966	1.30	.80	1.6:1	.23	.80	.3:1
1967	1.20	.62	1.9:1	.29	.62	.5:1
1968	1.20	.56	2.1:1	.24	.56	.4:1
1969	1.20	.45	2.7:1	.23	.45	.5:1
1970	1.10	.41	2.7:1	.24	.41	.6:1
1971	.70	.37	1.9:1	.33	.37	.9:1
1972	1.20	.35	3.4:1	.36	.35	.1:1
1973	2.50	.37	6.8:1	.67	.37	1.8:1
1974	1.80	.46	4.0:1	.41	.46	.9:1
1975	1.50	.48	3.1:1	.58	.48	1.2:1
1976	1.80	.53	3.4:1	.73	.53	1.4:1
1977	1.80	.56	3.2:1	.51	.56	.9:1
1978	1.90	.54	3.5:1	.64	.54	1.2:1

Source: U.S. Department of Agriculture, Cotton and Wool Situation.

for synthetics and against cotton (Ward, 1969; Ga. Tech, 1977). On several occasions in recent years, the quantity of available cotton has fluctuated sharply (for example, during 1966-67 and 1973-74), while man-made fibers have remained available. This has produced price instability in cotton, thereby curtailing some cotton fiber shipments. The instability of cotton supplies has added impetus to the switch to man-made fibers 1/.

In support of these contentions, Blakeley (1962) was able to show significant effects on the domestic consumption of cotton from both the domestic production of man-made fibers and the lagged domestic mill consumption of cotton 2/. These variables outweighed cotton fiber price in their respective effects on mill cotton consumption. Blakeley estimated the own-price elasticity of cotton fiber demand at -0.86, an estimate which he notes as higher than that obtained by other researchers. Evans (September 1977) found that the domestic mill consumption of cotton was significantly associated with total domestic fiber consumption, cotton fiber prices, and polyester staple fiber prices. The prices' terms carried the heaviest weights in Evans' equations, and polyester fiber prices had slightly greater explanatory power than cotton fiber prices. Own (cotton fiber) price elasticity was estimated at -0.25 to -0.35, and cross (cotton-polyester fiber) price elasticity was estimated at 0.35 to 0.40. Using price ratios, Evans was also able to show that a change in relative prices favorable to polyester had a highly significant impact on the domestic mill consumption of cotton fiber.

Ward (1969) generated numerous equations relating the consumption of individual fibers to own and competing fiber prices, and to total domestic fiber consumption. In general, Ward found that own and cross price effects were highly significant in fiber market share determination through time. In cotton, own-price was of less importance than competing man-made fiber prices, especially non-cellulosics. In non-cellulosics, own-price effects were relatively more important than cross price effects.

Ward generated numerous estimates of own and cross price elasticities of fiber consumption. These are summarized in the table below (Ward, 1969, p. 142).

1/ For a discussion of these considerations, see Barlowe and Donald (1971); and Barlowe, Russell G., Analysis of Cotton and Man-made Fiber Substitution in End-use Item Consumption in the United States, Unpublished Masters Thesis, 1967, University of Maryland.

2/ The influence of previous period consumption on present period consumption is actually a measure of the structural momentum in the system.

Approximate Direct and Cross-Elasticities Between Raw Fiber Consumption and Fiber Prices

Fiber Consumption	Raw Riber Prices			
	Cotton	Wool	Cellulosic	Non-cellulosic
Cotton	0 to -0.1	0	0.4 to 0.6	0.2 to 0.4
Wool	0 to 0.2	-0.3 to -0.5	0.4 to 0.7	0.6 to 1.0
Cellulosic	0.2 to 0.4	0	-0.1 to -0.3	0.3 to 0.6
Non-cellulosic	0	0	0	-1.0 to -1.5

For cotton, all elasticities were relatively low, but cross-price effects were more important than own-price effects 1/. For man-made non-cellulosics, elasticities were moderate to greater-than-unity, with own-price effects more important than cross-price effects.

Ward notes the great influence of the supply reliability, technology, and inertia factors in the determination of fiber market shares, and partially attributes the explanatory power of his total fiber consumption variables to such considerations. Ward and the other authors also note that short term responses to changes in relative prices are apparently small, but that such changes have major significance in the longer term.

This analysis generated four functions relating to the competition for market share between cotton and non-cellulosic fibers. Findings, shown on Table V-35, generally support the discussion of findings by earlier writers. Equations 5 and 6 relate the 1965-1977 total textile market shares of cotton fiber and non-cellulosic fibers to the prices of the two fibers during those years. The two equations account for 94 to 96 percent of the variation in market shares during the years observed. Fiber share elasticities 2/ for cotton (Equation 5) are estimated as follows: own-price, -0.29 and cross-price (cotton share non-cellulosic price) 0.37. For non-cellulosics (Equation 6) the elasticities are estimated as: own-price, -0.46 and cross-price (non-cellulosic share-cotton price) 0.46.

Equations 7 and 8 relate the 1965-1977 market shares of cotton and non-cellulosic fibers in home furnishing end-uses to the prices of the two fibers during those years. The two equations account for about 94 percent of the variation in home furnishing end-use fiber market shares during the years observed. Market share elasticities for the two fibers in their home

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1/ Many post-war researchers have estimated the own-price elasticity of cotton fiber in a range between -0.1 and -0.4.

2/ See footnote, p. V-35.

Table V-35. Functional relationships in interfiber competition

Equation 5. Title: Cotton fiber share of U.S. textile products as a function of cotton fiber price and lagged non-cellulosic fiber price

dependent variable	: cotton fiber share. Observed mean:	376.53846
independent variable	: cotton price. Observed mean:	47.15384
independent variable	: lagged non cellulosic price. Observed mean:	57.92307

Equation 5.
$R^2=.959$

$$\underset{\text{cotton fiber share}}{376.53846} = 347.33157 - 2.30466\ \underset{\text{cotton price}}{(47.15384)} + 2.38041\ \underset{\text{lagged non-cellulosic price}}{(57.92307)}$$

t for Ho: parameter = 0	:	6.55	-6.41
probability of a greater t by chance	:	.0001	.0001
F for ind. var. SS	:	118.73	41.08
probability of a greater F by chance	:	.0001	.0001

Equation 6. Title: Non-cellulosic fiber share of U.S. textile products as a function of cotton fiber price and lagged non-cellulosic fiber price

dependent variable	: non-cellulosic share. Observed mean:	458.84615
independent variable	: cotton price. Observed mean:	47.15384
independent variable	: lagged non-cellulosic price. Observed mean:	57.92307

Equation 6.
$R^2=.941$

$$\underset{\text{non-cellulosic share}}{458.84615} = 462.27596 + 4.43801\ \underset{\text{cotton price}}{(47.15384)} - 3.67209\ \underset{\text{lagged non-cellulosic price}}{(57.92307)}$$

t for Ho: parameter = 0	:	6.55	-6.41
probability of a greater t by chance	:	.0001	.0001
F for ind. var. SS	:	118.73	41.08
probability of a greater F by chance	:	.0001	.0001

Equation 7. Title: Cotton fiber share of total fiber use in home furnishings as a function of cotton fiber price and lagged non-cellulosic fiber price

dependent variable	: cotton fiber/home furnishings. Observed mean:	36.83846
independent variable	: cotton price. Observed mean:	47.15384
independent variable	: lagged non-cellulosic price. Observed mean:	57.92307

Equation 7.
$R^2=.946$

$$\underset{\text{cotton fiber/ home furnishings}}{36.83846} = 38.47239 - .32647\ \underset{\text{cotton price}}{(47.15384)} + .23757\ \underset{\text{lagged non-cellulosic price}}{(57.92307)}$$

t for Ho: parameter = 0	:	-7.32	6.29
probability of a greater t by chance	:	.0001	.0001
F for ind. var. SS	:	136.92	39.60
probability of a greater F by chance	:	.0001	.0001

Equation 8. Title: Non-cellulosic fiber share of total fiber use in home furnishings as a function of cotton fiber price and lagged non-cellulosic fiber price

dependent variable	: non-cellulosic/home furnishing. Observed mean:	48.71538
independent variable	: cotton price. Observed mean:	47.15384
independent variable	: lagged non-cellulosic price. Observed mean:	57.92307

Equation 8.
$R^2=.937$

$$\underset{\text{non-cellulosic/ home furnishings}}{48.71538} = 48.26342 + .52468\ \underset{\text{cotton price}}{(47.15384)} - .41933\ \underset{\text{lagged non-cellulosic price}}{(57.92307)}$$

t for Ho: parameter = 0	:	6.44	-6.08
probability of a greater t by chance	:	.0001	.0001
F for ind. var. SS	:	112.12	36.98
probability of a greater F by chance	:	.0001	.0001

Source: Development Planning and Research Associates, Inc.

furnishing end-uses are estimated as follows: for cotton (Equation 7), own-price, -0.42 and cross-price (cotton share non-cellulosic price), 0.37. For non-cellulosics, the elasticity estimates are: own-price, -0.50 and cross-price (non-cellulosic share-cotton price) 0.51. Standard errors associated with the regression parameter in all four equations ranged between 12 and 16 percent of those parameters. Again, the statistical results require interpretative care and comparison with the results of other researchers. The results generally support those of the other works cited.

4. Price Indexes

BLS publishes two types of indexes, industry and producer price (formerly wholesale price index), which are applicable to a study of prices within the textile industry. The industry indexes provide indexes on the output of SIC industries at the 4 digit level and product classes at the 5 digit level. While these indexes cover information which could be very valuable in an analysis of the industry, the series are relatively new and provide very little data prior to 1975. Consequently, these indexes are excluded from further consideration in this study.

The Producer Price Indexes (PPI) provide a measure of price movements at several levels. First it provides an index of prices at the aggregate industry level - Textile Products and Apparel; then it provides indexes of the major classifications and groupings discussed previously. Finally, it gives price indexes for a number of specific commodities.

Textile products underwent a significant reclassification in 1976 in order to reflect the decline in importance of wool products to the textile industry and the increase in importance of synthetic and knit products. Prior to the reclassification, textile products had been grouped according to type of fiber. For example, the synthetic wholesale price index components included unprocessed and processed yarn, fibers, and fabrics. With the reclassification, textile products are now grouped largely according to current marketing patterns. This reclassification should facilitate analysis of prices in terms of production flows. A comparison of the groupings under the two systems is shown below.

WPI, Textile Products and Apparel

Prior to 1976	1976
Cotton products	Synthetic fibers
Wool products	Processed yarns and thread
Synthetic	Grey fabrics
Apparel	Finished fabrics
	Apparel

The Textile Products and Apparel PPI reflect changes in both textile products and apparel. Changes in the index are weighted such that about 46 percent of the change is attributable to changes in textile products while 54 percent is attributable to apparel. Within textile products weight of each component are listed below:

Synthetic fiber	14%
Processed yarn and thread	21
Grey fabric	23
Finished fabric	44
	100%

The price movements between all commodities, and textile products and apparel are compared in Table V-36. During the past 10 years (except for 1975), textiles have lagged behind all commodities. Prior to 1972, the lag was minor with textiles increasing at an average rate of 2.6 percent per year while all commodities increased 3.6 percent. Since 1972, textiles have increased appreciably less with annual increases averaging 6.4 percent against 10.4 percent for all commodities. Partial explanation of this difference lies in the changes in the weighting system applied to textiles. Prior to 1975, a large part of the increase in the producer's index was due to acceleration of prices in cotton textiles. However, with the reclassification in 1976, a greater weight to movements in prices of synthetics and knit fabric tended to depress the overall index.

Price indexes of the products of the major textile markets are also shown in Table V-36. Apparel products, which includes clothing and hosiery, increased at a rate slightly higher than the composite textile and apparel index through 1972. Since then it has lagged, in 1976 it was about 10 points less. This difference points out that the prices of fabrics have actually increased faster than the prices of apparel.

Textile home furnishing prices have increased significantly higher than both the composite index and the apparel index over the past few years. This is due primarily to a large increase in 1974 when prices in home furnishings increased over 25 percent contrasted to an increase of less than 10 percent in the apparel prices. The price indexes of carpets has substantially lagged the other products over the past 10 years. Except for 1973, price increases for carpet have been considerably less than 10 percent. Hosiery, which is a component of the apparel index, has actually decreased over the past ten years. Hosiery is shown separately here because it is delineated from the other fabrics in a subsequent part of this study.

Inputs to the textile market system include wool, cotton, and synthetic fibers. Synthetic fibers consist of unprocessed filament yarn as well as staple and tow. A comparison of the fiber indexes is also shown in Table V-36. The index for natural fibers climbed to over 200 (twice that of 1967) in 1976. Among cotton and wool, the indexes have fluctuated considerably throughout the period. All of the fibers reach indexes of about 200 in 1973 and dropped off drastically in 1975 rising in 1976. Domestic wool

Table V-36. Producer price indexes - fabrics and fibers (cotton, wool, synthetics)

	Code	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Grey Woven Fabrics													
Broad woven	0337								*	100.0	106.2	104.68	118.8
Cotton (Old)	031202	100.0	102.8	103.7	104.4	110.5	124.1	145.7	178.5	177.9	NA	NA	NA
(New)	033701								*	100.0	108.8	112.6	121.6
Synthetic	033703								*	100.0	106.0	101.1	118.7
Jute & burlap	033704	100.0	97.3	106.5	107.6	124.8	142.0	133.0	181.8	137.7	110.1	112.6	128.0
Grey Knits													
Knits	0338								*	100.0	104.1	107.4	116.2
Synthetics	033802								*	100.0	76.0	79.7	90.0
Finished Fabrics													
Broad woven	0342								*	100.0	105.4	110.3	112.1
Cotton (Old)	034201	100.0	104.0	104.0	107.6	110.6	120.5	143.5	178.1	173.2	NA	NA	NA
(New)									*	100.0	109.0	120.3	119.6
Synthetic (Old)	034203	100.0	111.1	115.1	104.3	101.5	116.9	1,145.5	161.7	140.6	NA	NA	NA
(New)									*	100.0	101.3	99.7	101.5
Knits	0343								*	100.0	96.2	95.5	95.5
Cotton	034301								*	100.0	110.7	118.4	118.7
Synthetics	034303								*	100.0	95.1	93.8	93.8
Nylon tricot	03430341	100.0	92.1	89.3	81.2	88.0	90.7	94.2	128.3	112.3	110.0	119.4	121.6
Acetate tricot	03430351	100.0	107.2	102.9	96.4	100.6	87.7	90.9	126.7	131.7	127.3	130.3	NA
Plant and Animal Fiber													
Fiber	015	100.0	104.6	93.1	90.2	92.8	117.5	197.8	193.9	153.1	223.9	171.0	193.4
Raw Cotton	0151	100.0	107.2			97.6		193.1	199.3	155.2	234.1	174.1	198.4
Domestic apparel wool	0152	100.0	102.9			59.2		194.9	139.3	109.4	139.9	148.6	153.8
Foreign wool	0153	100.0	105.5			84.8		237.0	191.8	165.1	202.6	210.2	222.3
Synthetic Fibers	031								*	100.0	102.4	107.3	109.6
Unprocessed filament yarn	0315								*	100.0	103.1	108.9	112.3
Cellulosic	031501	100.0	101.3	102.8	102.5	105.2	107.7	109.9	119.4	130.6	139.7	139.6	148.6
Non-cellulosic	031502	100.0	100.0	100.0	100.0	100.0	100.0	99.9	102.3	103.2	105.9	113.5	116.1
Staple	0316								*	100.0	101.5	104.5	104.4
Tow	0317								*	100.0	98.8	106.2	111.0
Textile Markets													
Textile product and apparel		100.0	103.7	106.0	107.1	109.0	113.6	123.8	139.1	137.9	148.2	154.0	159.8
Apparel		100.0	103.6	107.4	110.8	113.6	114.8	119.0	129.5	133.4	139.9	147.3	152.4
Home furnishings (sheets and pillows)		100.0	104.2	100.8	103.5	104.9	109.2	113.3	143.3	151.9	159.3	171.3	178.6
Carpets		100.0	100.7	99.0	96.5	96.1	101.0	110.9	114.6	117.9	NA	NA	126.2
Hosiery	100.0	100.0	98.7	NA	NA	97.7	97.7	98.0	100.0	91.2	107.6	NA	100.5

* Asterisks indicate those series begun in 1975.

Source: Bureau of Labor Statistics, Producer Prices and Price Indexes.

reflects the lowest index at less than 140 in 1976. While the natural fibers nearly doubled since 1967, the synthetic fibers have remained relatively stable. A composite index of synthetics was not developed until the 1976 reclassification; consequently synthetic price movements cannot be compared directly with the natural fibers. However, the two unprocessed filament yarn indexes (cellulosic and non-cellulosic) reveal the relative stability of the synthetic prices. Cellulosic yarn rose to about 140 by 1976 while non-cellulosic remained relatively stable, rising to less than 120.

The indexes of fabric prices are shown in Table 36. Again, the indexes for the major groupings were not developed until the reclassification in 1976. Consequently movement of prices for grey and finished fabrics cannot be effectively analyzed.

Indexes are available for grey and finished cotton broad woven fabrics and finished wool. The grey cotton broad woven fabric index increased to about 180 by 1975 and leveled off for the next 2 years (actually decreasing slightly in 1977). Finished cotton fabric moved with the grey fabrics until 1976. In 1976, the index increased to 120.3 (1975 base) contrasted to an index of 105.6 for grey cotton fabrics. Wool finished fabrics is the only fabric with a complete series (other than burlap and jute). Its index had advanced to 140.7 by 1977, dropping slightly during the 1975 recession.

VI. REPRESENTATIVE MODEL PLANTS

Over 1,100 individual textile mills are engaged in manufacturing processes which, in one form or another, generate wastewaters and thus fall within the scope of this analysis and would be subject to effluent control guidelines. Approximately 80 percent of these existing mills are discharging wastewater into publicly owned treatment works (POTW's) and are classified as indirect dischargers; the remaining 20 percent are discharging directly into receiving waters (rivers and lakes) and are classified as direct dischargers. Model plants representing both types of dischargers were developed from a synthesis of data obtained from surveys of the industry as well as published sources.

In the model plant development, it was assumed that the direct dischargers (except as noted below) have treatment systems which meet BPT requirements while the indirect dischargers have no systems in place.1/ In addition to model plants representing existing mills or sources, models were developed to represent new sources (mills to be constructed in the future). As in the case of the existing mills, new source models were developed both for direct and indirect dischargers. In order to facilitate the analysis in this chapter, model plant data are organized (and identified) under four classifications.

(1) existing direct dischargers,
(2) existing indirect dischargers,
(3) new source direct dischargers,
(4) new source indirect dischargers.

A. Model Plant Development

Model plants were developed primarily from data accumulated from two surveys of the industry. The initial survey was technical in nature and was conducted in conjunction with the preparation of the Development Document. The survey was designed to develop a descriptive and representative data base covering:

(1) number and location of facilities,
(2) production levels,
(3) wastewater discharge quantities,
(4) methods of discharge,
(5) general treatment status.

From this data base, the industry was divided into subcategories (and subdivisions) discussed in Chapter III. A range of mill sizes in terms of flow rates was identified; eight flow rates were then selected as a means

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1/ Plants in three subcategories have not met BPT. These include hosiery products, nonwoven manufacturing and felted fabric processing.

of establishing capacities for representative model plants. These flow rates ranged from a low of 0.05 million gallons per day (mgd) to a high of 5.0 mgd as shown in Table VI-1. Capacity levels were estimated for at least three flow levels in each of the subcategories. These levels provided the basis for the subsequent preparation of required control costs and development of model plants.

As a part of this economic analysis, a second survey was conducted involving a random sample of about a quarter of the wet processors in the industry and covered questions on production, finance and wastewater discharge. The survey responses revealed that additional segmentation within the industry was required in order to reflect the economic characteristics of different type mills in terms of product ownership and degree of integration. Consequently, in addition to categorization by type processing (simple, complex), mills were further categorized by type of mills to include (1) integrated, (2) commission, and (3) own fabric (yarn, hosiery) finishers.

Responses to the survey provided the data base from which the financial profiles of the individual model plants were constructed. One or more models were developed for each of the applicable capacity levels shown in Table VI-1 in order to represent the above type mills found in the industry. Models consisted of pro forma income statements and portions of the balance sheets (or investment characteristics).

The initial step in developing model plants was the conversion of capacity levels to annual production. This was accomplished by projecting the utilization rates for each model plant from an analysis of the survey data and certain published data (primarily the Federal Reserve Bulletin). The product of these utilization rates and appropriate capacities provided the model plant production levels. With the production levels established for each of the subcategories, the financial profiles were then constructed by deriving and applying certain key parameters such as prices, profits, expenses, and book and salvage values of plant and equipment. The parameters were derived principally from an analysis of the survey data in which the financial data were expressed as a percent of sales in order that they might be viewed within a common framework. The parameters selected for the model plants generally represent the medians of the applicable data of surveyed plants which fell within the size ranges appropriate to each model plant. The medians were used for several reasons. The use of medians eliminated or diminished the influence which extremely high or extremely low values would have on averages. Also, in analyzing impacts, the use of medians tended to produce levels of profits for the model plants which could be assumed to be the median levels for actual plants within given size ranges. From this assumption, estimates could be made of how many plants were better off and how many were worse off than the model plants with the imposition of the various control technologies.

After establishing production levels for the model plants, the next step was to calculate the sales volume by multiplying the annual production by the appropriate price level. Prices were expressed in dollars per pound of

Table VI-1. The textile industry, selected model plant capacities (flow rates and capacities)

Subcategory	Type 1/ Discharger	Flow Rate - mgd							
		0.05	0.11	0.25	0.6	1.0	1.5	3.0	5.0
		capacity kkg per day							
1. Wool scouring	D	16.2	35.6	81.0					
	I	16.2		81.0					
2. Wool finishing	D				7.4		18.6	37.3	
	I			3.1			18.6	37.3	
3. Omitted									
4. Woven fabric finishing									
a. Simple processing	D		5.4		29.6		73.9		
	I	2.4		12.3		49.3			
b. Complex processing	D				23.3			116.3	193.8
	I			9.7	23.3			116.3	193.8
c. Desizing	D				21.4		53.6	178.5	178.5
	I				21.4		53.6		178.5
5. Knit fabric finishing									
a. Simple processing	D			8.0		32.2		160.8	
	I	1.6			19.3	32.2			
b. Complex processing	D			7.7	18.5	30.9			
	I			7.7	18.5		46.3		
c. Hosiery products	D	2.5	5.5						
	I	2.5	5.5	12.6					
6. Carpet finishing	D			20.2	48.6		121.5		
	I		8.9		48.6		121.5		
7. Stock & yarn finishing	D			9.8	23.5	39.1	58.6		
	I		4.3	9.8	23.5		58.6		
8. Nonwoven manufacturing	D		10.4	23.6					
	I		10.4	23.6	56.7				
9. Felted fabric processing	D	0.9	2.0						
	I	0.9		4.4	10.7				

1/ Type dischargers: D = direct and I = indirect.

Source: Development Document for Proposed Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Textile Mills Point Source Category, U.S. Environmental Protection Agency, Effluent Guidelines Division, EPA 440/1-79-022b, October 1979.

output which represented a composite of a variety of product mixes. For example, the woven fabric subcategory reflects mills of which 48 percent were producing woven fabric only, 13 percent producing narrow fabrics, and the remainder processing a variety of mixes such as fabric and yarn, and fabric and sheeting. In the knit fabric subcategory, 28 percent of the mills surveyed were producing circular fabric only, 17 percent were producing warp and the remainder were producing mixes of fabric and apparel (underwear).

With annual sales established, pro forma income statements were then constructed to include appropriate cost structures and profit levels. The financial data comprising the statements were based on the average economic conditions of the period 1973-1977 and were obtained from the industry surveys and published sources. It was assumed that the 1973-1977 period was typical of the industry; consequently, the profiles could be expected to be representative of future operations.

The model plant profiles were completed with the development of the asset and financial structures. These structures, which were developed primarily for use in the NPV analyses, were based, again, on the surveys and published sources. The structures define the investment characteristics of each of the model plants and include total assets, fixed assets, current assets, current liabilities, net working capital (current assets less current liabilities) and capital investments. In addition, the characteristics include the salvage values of model plants which equal the sum of net working capital and liquidation values of plant and equipment. These values were key parameters in the NPV analyses since an overestimation would tend to overestimate the economic impacts of effluent controls which an underestimation would result in the understatement.

In developing the profiles, the year 1979 was established as baseline. Since financial data in the surveys were based on 1977 dollars, the model plant parameters were adjusted to 1979 fourth quarter dollars by applying the appropriate GNP deflator.

B. Model Plant Characteristics

The textile mills vary by operational and financial characteristics; thus, the models will not accurately depict the characteristics of any existing mill. However, since the subcategories discussed above group the mills into segments having similar processes, discharge methods, and economic characteristics, it was possible to develop models which are descriptive of the common operational and financial characteristics.

A total of 126 models were developed to represent existing plants in the textile industry: 57 for direct dischargers and 69 for indirect dischargers. In addition, 39 models were developed to represent the new source plants: 18 for direct dischargers and 21 for indirect. Where appropriate, more than one type of model was developed for the designated production levels (sizes) within subcategories. As indicated above, these represent the three types of mills: commission, own fabric and integrated. The "commission" models represents those dyeing and finishing plants which finish the textiles on a contract or commission basis. These plants do not take title to the textiles being processed. The "own fabric" models represent those dyeing and finishing plants which purchase or otherwise take title to the textiles being processed. In most cases, these are the dyeing and finishing operations of vertically integrated firms, in which greige fabric is produced in a mill at one facility and then sent to the dyeing and finishing plant at another facility to be finished. The "integrated" models represent those mills in which the fabric is both fabricated and finished in the same facility. While the economic characteristics of these three type models are significantly different, the waste characteristics and control technologies for a specific capacity and type process within each subcategory are identical. For example, the small commission model with a daily capacity of 5.4 kkg in the woven fabric finishing subcategory (simple processing) has a financial profile different from the small integrated model in the same subcategory (and subdivision); however, the waste characteristics and control costs are identical. The model plants as discussed above are listed in the subsequent table in this chapter. The tables contain four sets of data: operational characteristics, investment characteristics, depreciation and interest, and profitability and cash flow. For each set of data, there are four tables--one applicable to existing direct dischargers, one to existing indirect dischargers, one to new source direct dischargers and one to new source indirect dischargers.

To facilitate the correlation of model plants developed in this report with the subcategorization discussed in the Development Document (Table VI-1), the subcategory numbers (1-9) and subdivision letters (a-c) will be indicated in parenthesis after each model plant discussed subsequently in the text.

For the existing models, three capacity levels (sizes) were established for each subcategory (and subdivision) for both direct and indirect dischargers, except in stock and yarn finishing (7), in which there were four. Model plant capacities are expressed in terms of thousands of kilograms of output per day. In the majority of cases, the capacities of the medium and large models in the direct discharger category corresponds with those in the indirect categories. However, the capacities of the small plants of the two discharge categories differ; the capacities of the small plants in the indirect category are about half the size of those in the direct discharge category.

For the new source plants, only one model size was developed for each subcategory (and subdivision) to reflect the most likely size that can be expected to be constructed. The capacity sizes correspond with those of the existing models, usually the medium size. Consequently, the same size designation were used. No new source models were developed for the wool scouring subcategory since it was not considered likely that any of these mills would be constructed in the foreseeable future.

C. Operational Characteristics

The operational characteristics for the existing direct and indirect discharger models are summarized in Tables VI-2 and VI-3. These characteristics were determined primarily from the surveys and include data on utilization, annual production and numbers of employees. Utilization rates were based on a 250-day work year and varied between type dischargers, subcategories and sizes. The lowest utilization rates are found in the wool scouring (1) and carpet finishing (6) subcategories, both for direct and indirect dischargers. The small models in both of these subcategories have rates below 70 percent. The small wool scouring models (1) have rates of 65 percent while the small carpet finishing models (6) have rates of only 60 percent. The large commission yarn model (7), indirect discharger, also has a rate of 60 percent. The utilization rates of the remaining models varied between 75 to 85 percent. Slightly higher rates are found among the direct dischargers. In this category, about 45 percent of the models have rates of 85 percent. In the indirect discharger category, about 50 percent of the models had rates of 80 percent with only a third having higher rates.

The annual production levels of the model plants were derived as a product of the daily capacities (in pounds), utilization rates, and 250 (number of days in the work year). Annual production of the wool scouring models (1) is measured in terms of the input to the plant (grease wool) since this normally is the basis used in establishing commission fees. The production of all other models is measured as the plants output and represents a composite of type of textiles produced in each of the subcategories. As indicated above, it does not represent any specific type (other than the broad classification of materials within a subcategory), size or weight of material. Product mixes of models within a subcategory can be expected to vary from one size category to another; consequently, the prices varied between sizes.

The number of production workers for each model was based on an examination of the survey data. The number of nonproduction workers was based on the applicable rates of nonproduction workers to production workers as reflected in the surveys and in Census data. The largest model in terms of employment is the integrated model in woven fabric finishing (complex processing) (4c) in the direct discharger category. This model carries an employment of over 4,000 workers and represents one of the few largest plants in the industry. The smallest model is the small commission model in woven fabric finishing (simple processing) (41), indirect discharger, with an employment of less than 20 workers. In general, within a subcategory, the commission

Table VI- 2. The textile industry, representative existing model plants' operational characteristics - direct dischargers

Subcategory	Size	Daily capacity	Type plant	Utilization rate	Annual production	Number of employees		
						Production	Non-production	Total
		(KKg)		(percent)	(000 lbs)			
1. Wool scouring	Small	16.2	Commission	65	5,800	77	39	116
	Medium	35.6	Commission	75	14,700	155	8	163
	Large	81.0	Commission	80	35,700	248	37	285
2. Wool finishing	Small	7.4	Integrated	80	3,300	374	56	430
	Medium	18.6	Integrated	85	8,800	371	20	391
	Large	37.3	Integrated	85	17,500	1,099	122	1,221
3. (Omitted)								
4. Woven fabric finishing A. Simple	Small	5.4	Commission	80	2,400	35	3	38
			Own fabric	80	2,400	42	12	54
			Integrated	80	2,400	203	36	239
	Medium	29.6	Commission	75	12,200	211	47	258
			Own fabric	85	13,900	390	101	491
			Integrated	80	13,000	1,132	200	1,332
	Large	73.9	Commission	75	30,600	527	132	659
			Integrated	85	34,700	614	76	690
B. Complex	Small	23.3	Commission	75	9,600	166	37	203
			Integrated	85	10,900	949	168	1,117
	Medium	116.3	Commission	85	54,500	943	208	1,151
			Own fabric	85	54,500	1,657	248	1,905
			Integrated	80	51,300	1,962	216	2,178
	Large	193.8	Integrated	85	90,600	4,005	440	4,445
C. Desizing	Small	21.4	Commission	75	8,800	109	24	133
			Own fabric	85	10,000	281	72	353
			Integrated	85	10,000	1,920	339	2,259
	Medium	53.6	Commission	75	22,100	381	95	476
			Own fabric	85	25,100	709	135	844
			Integrated	85	25,100	1,180	146	1,326
	Large	178.5	Own fabric	85	83,600	2,542	380	2,922
			Integrated	80	78,700	2,533	278	2,811
5. Knit fabric finishing A. Simple	Small	8.0	Commission	75	3,300	83	17	100
			Integrated	75	3,300	225	46	271
	Medium	32.2	Commission	75	13,300	305	96	401
			Integrated	85	15,000	810	61	871
	Large	160.8	Commission	80	70,900	1,628	514	2,142
			Integrated	80	70,900	2,525	189	2,714
B. Complex	Small	7.7	Commission	75	3,200	80	16	96
			Integrated	85	3,600	245	50	295
	Medium	18.5	Integrated	85	8,700	324	31	405
	Large	30.9	Commission	80	13,600	312	99	411
			Integrated	85	14,400	778	59	837
C. Hosiery	Small	2.5	Own hosiery	80	1,100	107	17	124
			Integrated	85	1,200	299	16	315
	Medium	5.5	Own hosiery	80	2,400	141	9	150
6. Carpet finishing	Small	20.2	Integrated	60	6,700	292	68	360
	Medium	48.6	Integrated	75	20,100	196	92	288
	Large	121.5	Integrated	85	57,000	605	171	776
7. Stock & yarn finishing	Small	9.8	Commission	80	4,300	41	13	54
			Own yarn	80	4,300	115	38	153
			Integrated	85	4,600	121	21	142
	Medium	23.5	Own yarn	80	10,300	231	71	302
			Integrated	85	11,000	371	44	415
	Large	39.1	Own yarn	80	17,300	263	81	344
			Integrated	85	18,400	599	114	713
	X-Large	58.6	Integrated	85	27,500	895	171	1,066
8. Non-woven manufacturing	Small	10.4	N.A.	80	4,600	77	27	104
	Medium	23.6	N.A.	85	11,000	168	90	258
9. Felted fabric finishing	Small	0.9	N.A.	80	400	98	50	148
	Medium	2.0	N.A.	85	900	218	73	291

Table VI-3. The textile industry, representative existing model plants' operational characteristics - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Utilization rate	Annual production	Number of employees		
						Production	Non-production	Total
		(kkg)		(%)	(000 lbs)			
1. Wool scouring	Small	16.2	Commission	65	5,800	22	6	28
	Large	31.0	Commission	80	35,700	419	62	481
2. Wool finishing	Small	3.1	Integrated	80	1,400	165	30	195
	Medium	18.6	Integrated	85	8.600	553	61	614
	Large	37.3	Integrated	85	17,500	1,099	122	1.221
4. Woven fabric finishing A. Simple	Small	2.4	Commission	80	1,100	16	1	17
			Own fabric	80	1,100	19	7	26
			Integrated	80	1,100	93	16	109
	Medium	12.3	Commission	80	5,400	125	27	152
			Own fabric	80	5,400	95	39	134
			Integrated	80	5,400	194	37	231
	Large	49.3	Commission	75	20,400	675	169	344
			Own fabric	85	23,100	653	124	777
			Integrated	85	23,100	409	50	460
B. Complex	Small	9.7	Commission	80	4,300	99	22	121
			Own fabric	80	4,300	76	31	107
			Integrated	80	4,300	155	30	185
	Medium	23.3	Commission	75	9,600	144	32	176
			Own fabric	85	10,300	306	79	385
			Integrated	85	10,900	949	168	1,117
	Large	116.3	Commission	80	51,300	718	46	764
			Own fabric	85	54,500	1,657	248	1.905
			Integrated	85	54,500	2,084	229	2,313
C. Desizing	Small	21.4	Commission	80	9,400	141	31	172
			Own fabric	80	9,400	264	58	322
			Integrated	80	9,400	818	144	962
	Medium	53.6	Commission	75	22,100	609	153	762
			Own fabric	85	25,100	709	135	844
			Integrated	85	25,100	1,180	146	1,326
	Large	178.5	Own fabric	85	83.600	2,542	380	2.922
			Integrated	80	78,700	3,010	330	3,340
5. Knit fabric finishing A. Simple	Small	1.6	Commission	80	700	21	4	25
			Integrated	75	700	49	64	113
	Medium	19.3	Commission	75	8.000	184	58	242
			Integrated	85	9,000	335	84	419
	Large	32.2	Commission	75	13,300	305	96	401
			Integrated	85	15,100	730	55	785
B. Complex	Small	7.7	Commission	75	3,200	146	30	176
			Integrated	75	3,200	218	45	263
	Medium	18.5	Commission	75	7,600	174	55	229
			Integrated	85	8,700	324	81	405
	Large	46.3	Commission	80	20.400	468	148	616
			Integrated	85	21.700	1,172	88	1.260
C. Hosiery	Small	2.5	Own hosiery	80	1,100	123	15	138
			Integrated	85	1,200	297	44	341
	Medium	5.5	Own hosiery	80	2.400	141	150	9
			Integrated	90	2,700	397	54	451
	Large	12.6	Own hosiery	85	6,000	770	49	819
			Integrated	90	6,300	927	126	1,053
6. Carpet finishing	Small	8.9	Integrated	60	2,900	127	30	157
	Medium	48.6	Integrated	75	20,100	147	57	204
	Large	121.5	Integrated	80	53.600	550	151	701
7. Stock & yarn finishing	Small	4.3	Commission	80	1,900	27	9	36
			Own yarn	80	1,900	65	10	75
			Integrated	85	2,000	53	9	62
	Medium	9.8	Commission	80	4,300	41	11	52
			Own yarn	80	4,300	126	16	142
			Integrated	85	4,600	121	21	142
	Large	23.5	Commission	60	7,500	109	24	133
			Own yarn	80	10,300	231	71	302
			Integrated	85	11,000	304	36	340
	X-large	58.6	Own yarn	80	25,900	612	163	775
			Integrated	80	25,900	371	44	415
8. Nonwoven manufacturing	Small	10.4	N.A.	80	4,600	100	34	134
	Medium	23.6	N.A.	85	11,000	156	75	231
	Large	56.7	N.A.	80	25,000	968	199	1,167
9. Felted fabric finishing	Small	0.9	N.A.	80	400	98	50	148
	Medium	4.4	N.A.	85	2,100	153	37	240
	Large	10.7	N.A.	85	5,000	33	11	44

models are the smallest while the integrated mills are the largest. In most cases, the own fabric models have fewer employees than the integrated models. However, in a number of cases, the own fabric models have a greater employment since they represent finishing plants which include labor intensive operations such as cutting and sewing in addition to the finishing. Normally, it can be expected that the medium plants within a subcategory will have a smaller work force than the larger plants of the same type. However, in several cases, this relationship does not hold true primarily because of type operation and type product associated with the models. For example, in the indirect discharger category, the large felted fabric processing (9) model has only a sixth of the employees that the mdedium model has. In this case, the large model represents plants producing carpet underlay, a very labor extensive operation in which the output has a very low unit cost when compared to the product of other fitted fabric processing plants (9).

Operational characteristics of the new source models are outlined in Tables VI-4 and VI-5. The production and utilization rates are identical to those of the corresponding existing models. However, the employment levels are significantly less and reflect key assumptions in the development of the new source models. It was assumed that improvement in efficiencies would result in a 15 percent reduction in all operating costs (except of the textile inputs) when compared to those costs of the esixting models.

D. Investment Characteristics

The investment characteristics for the existing direct discharging, existing indirect, new source direct, and new source indirect models are depicted in Tables VI-6, VI-7, VI-8, and VI-9, respectively. Included in these tables are estimates for the models' assets (both fixed and current), current liabilities, net working capital, total invested capital, and salvage values for non-conforming uses. These are discussed below.

1. Fixed Assets

The fixed assets depicted in the tables are considered reflective of net or book values of the buildings, equipment, and land. As would be expected in an industry with a substantial number of older plants and equipment, the book values of the existing models' assets reflect significant levels of depreciation. These assets were estimated from information provided in the industry surveys.

2. Net Working Capital

Net working capital or operating capital is defined as that capital necessary to maintain the day to day operations of the mills. The computation for net working capital includes a firm's current assets minus current

Table VI-4. The textile industry, new source model plants operational characteristics direct dischargers (NSPS)

Subcategory	Size	Daily capacity	Type plant	Annual production	Utilization rate	Number of employees		
						Production	Nonproduction	Total
		(KKg)		(000 lbs)	(%)			
1. Omitted								
2. Wool finishing	Medium	18.6	Integrated	8,800	85	315	17	332
3. Omitted								
4. Woven fabric finishing								
a. Simple processing	Medium	29.6	Commission	12,200	75	179	40	219
			Own fabric	13,900	85	332	89	421
			Integrated	13,000	80	906	136	1,042
b. Complex	Medium	116.3	Commission	54,500	85	802	177	979
			Own fabric	54,500	85	1,408	211	1,619
			Integrated	51,300	80	1,570	173	1,743
c. Desizing	Medium	53.6	Commission	22,100	75	324	81	405
			Own fabric	25,100	85	603	115	718
			Integrated	25,100	85	1,003	124	1,127
5. Knit fabric finishing								
a. Simple processing	Medium	32.2	Commission	13,300	75	259	82	341
			Integrated	15,000	85	689	52	741
b. Complex processing	Medium	18.5	Commission	8,700	85	170	54	224
			Integrated	8,700	85	275	69	344
c. Hosiery products	Medium	5.5	Own hosiery	2,400	80	120	8	128
6. Carpet finishing	Small	20.2	Integrated	6,700	60	248	58	306
7. Stock & yarn finishing	Medium	23.5	Commission	10,300	80	84	26	110
			Own yarn	10,300	80	196	60	256
8. Nonwoven manufacturing	Medium	23.6	N.A.	11,000	85	143	77	220
9. Omitted								

Table VI-5. The textile industry, new source model plants operational characteristics indirect dischargers (PSNS)

Subcategory	Size	Daily capacity	Type plant	Annual production	Utilization rate	Number of employees		
						Production	Nonproduction	Total
		(KKg)		(000 lbs)	(%)			
1. Omitted								
2. Wool finishing	Medium	18.6	Integrated	8,800	85	470	52	522
3. Omitted								
4. Woven fabric finishing a. Simple processing	Medium	12.3	Commission	5,400	80	106	23	129
			Own fabric	5,400	80	81	33	114
			Integrated	5,400	80	155	30	185
b. Complex	Medium	23.3	Commission	9,600	75	122	27	149
			Own fabric	10,900	85	260	67	327
			Integrated	10,900	85	759	134	893
c. Desizing	Medium	53.6	Commission	22,100	75	518	130	648
			Own fabric	25,100	85	603	115	718
			Integrated	25,100	85	1,003	124	1,427
5. Knit fabric finishing a. Simple	Medium	19.3	Commission	8,000	75	156	49	205
			Integrated	9,000	85	285	71	356
b. Complex	Medium	18.5	Commission	7,600	75	148	47	195
			Integrated	8,700	85	275	69	344
c. Hosiery products	Large	12.6	Own hosiery	6,000	85	654	42	696
			Integrated	6,300	90	788	107	895
6. Carpet finishing	Medium	48.6	Integrated	20,100	75	125	48	173
7. Stock & yarn finishing	Medium	9.8	Commission	4,300	80	35	9	44
			Own yarn	4,300	80	107	14	121
8. Nonwoven manufacturing	Large	56.7	N.A.	25,000	80	823	169	992
9. Felted fabric processing	Medium	4.4	N.A.	2,100	85	130	74	204

Table VI-6. The textile industry, representative existing model plants' investment characteristics-direct dischargers

Subcategory	Size	Daily capacity	Type plant	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
		(kkg)		1,000 dollars 1/						
1. Wool scouring	Small	16.2	Commission	872.4	248.1	624.3	448.2	176.1	424.2	288.1
	Medium	35.6	Commission	2,966.2	1,876.9	1,089.3	351.9	737.4	2,614.3	1,491.5
	Large	81.0	Commission	7,203.5	4,558.1	2,645.4	854.7	1,790.7	6,348.8	3,622.1
2. Wool finishing	Small	7.4	Integrated	6,605.3	1,981.6	4,623.7	1,238.5	3.385.2	5,366.8	4,376.0
	Medium	18.6	Integrated	10,105.9	2,694.9	7,411.0	1.684.3	5,726.7	8,421.6	7.343.6
	Large	37.3	Integrated	52.867.5	9,975.0	42,892.5	25,935.0	16,957.5	26,932.5	384.2
3. (Omitted)										
4. Woven fabric finishing										
A. Simple processing	Small	5.4	Commission	726.6	283.9	442.7	275.7	167.0	451.0	237.2
			Own fabric	1,993.0	498.2	1,494.7	747.3	747.4	1,245.6	921.7
			Integrated	4,668.6	1,340.5	3,328.1	1,802.7	1,525.4	2,865.9	1,858.2
	Medium	29.6	Commission	5,094.7	2,415.6	2,679.1	1,537.2	1,141.9	3,557.5	1,651.4
			Own fabric	13,060.4	2,902.3	10,158.1	7,778.2	2,379.9	5,282.2	4,121.3
			Integrated	23,072.4	11,536.2	11,536.2	4,297.8	7,238.4	18,774.6	10,405.2
	Large	73.9	Commission	12,778.6	6,058.8	6,719.8	3,855.6	2,864.2	8.923.0	4,516.6
			Integrated	39,807.8	12,937.5	26,870.3	12,937.6	13,932.7	26,870.3	24,481.8
B. Complex processing	Small	23.3	Commission	4,009.0	2,039.0	1,969.9	898.5	1,071.4	3,110.4	1,472.3
			Integrated	20.483.3	4,931.2	15,552.1	8,534.7	7,017.4	11,948.6	9,672.7
	Medium	116.3	Commission	22,769.2	11.575.8	11,183.4	5,493.6	6,082.2	17,658.0	8.358.1
			Own fabric	50,031.0	14,715.0	35.316.0	25,663.0	9,653.0	24,368.0	17,069.4
			Integrated	76,789.9	18,486.5	58,303.5	31,995.8	26,307.7	44.794.2	36,261.9
	Large	193.8	Integrated	156.752.5	37,736.7	119,015.8	65,313.6	53,702.2	91,439.0	84,472.2
C. Desizing	Small	21.4	Commission	2,661.1	1,520.6	1.140.5	63.4	1,077.1	2.597.8	1,994.6
			Own fabric	9,396.0	2.714.4	6,681.6	4,969.4	1,712.2	4,426.6	3,069.4
			Integrated	16,008.0	9.744.0	6,264.0	870.0	5,394.0	15.138.0	7,830.0
	Medium	53.6	Commission	9,547.2	5,304.0	4,243.2	3,182.4	1,060.8	6.364.8	2,291.3
			Own fabric	23,448.4	8,597.8	14,850.7	10,577.9	4,272.8	12,870.6	8,597.8
			Integrated	28,794.7	9,358.3	19,436.4	9.358.2	10,078.2	19,436.4	15,117.2
	Large	178.5	Own fabric	81,259.2	29,795.0	51,464.2	34.309.5	17,154.7	46,949.8	32,142.5
			Integrated	71,906.6	18,359.1	53.547.5	25,090.8	28,456.7	46,815.8	44,673.9

Continued...

1/ In 1979 dollars.

Table VI-6 (Continued)

Subcategory	Size	Daily capacity	Type plant	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
		(kkg)		1,000 dollars[1]						
5. Knit fabric finishing A. Simple processing	Small	8.0	Commission	1,986.5	594.4	1,392.1	1.173.1	219.0	813.4	488.0
			Integrated	7,392.9	1,508.8	5,884.2	4,481.1	1,403.1	2,911.9	2,157.5
	Medium	32.2	Commission	5,100.8	2,441.9	2,658.9	2,007.7	651.2	3,093.0	1,877.5
			Integrated	34,470.0	6,894.0	27,576.0	17,717.6	9.858.4	16,752.4	13,305.4
	Large	160.8	Commission	27,191.6	13,017.3	14,174.3	10,703.0	3,471.3	16,488.5	11,281.6
			Integrated	162,928.2	32,585.6	130,342.6	62.564.5	67,778.1	100.363.8	84,071.0
B. Complex processing	Small	7.7	Commission	1,926.3	576.4	1,350.0	1,137.6	212.4	788.7	473.2
			Integrated	8,476.5	2,139.7	6,336.8	4,806.1	1,530.7	3,670.4	2,600.5
	Medium	18.5	Integrated	21,704.8	5,225.3	16,479.5	10,731.8	5,747.7	10,973.0	8,360.4
	Large	30.9	Commission	5,215.9	2,497.0	2,718.9	2,053.1	665.9	3,162.8	2,164.0
			Integrated	35,076.7	21,178.4	13,898.3	132.4	13.765.9	34,944.3	19,192.9
C. Hosiery products	Small	2.5	Own hosiery	698.5	116.4	582.1	349.3	232.8	349.3	349.3
			Integrated	6,576.8	2,790.1	3,786.6	1,973.0	1,813.6	4,603.7	2,501.2
	Medium	5.5	Own hosiery	6,920.6	1,845.5	5.075.1	2,922.0	2,153.1	3,998.6	3,260.4
6. Carpet finishing	Small	20.2	Integrated	11,221.0	2,614.6	8,606.4	7,538.8	1,067.6	3,682.2	2,374.9
	Medium	48.6	Integrated	14,399.6	2,399.9	11.999.7	9,503.8	2,495.9	4,895.8	3,935.9
	Large	121.5	Integrated	32,366.9	10,581.5	21.785.4	18,548.7	3,236.7	13,818.2	6,286.6
7. Stock & yarn	Small	9.8	Commission	953.6	445.8	507.7	383.9	123.8	569.7	302.2
			Own yarn	5,006.7	1,292.1	3,714.7	1,776.6	1,938.1	3.230.2	2,713.3
			Integrated	2,553.2	364.7	2,188.4	1.750.7	437.7	802.4	620.1
	Medium	23.5	Own yarn	8,877.0	3,287.8	5,589.2	4,438.5	1,150.7	4,438.5	3.123.4
			Integrated	9,563.4	3,187.8	6,375.6	3,400.3	2,975.3	6,163.1	4,569.2
	Large	39.1	Own yarn	14,909.8	5,522.2	9,387.7	7,454.9	1,932.8	7,455.0	5,246.1
			Integrated	27,081.1	8,862.9	18,218.2	11,324.8	6,893.4	15.756.3	11,324.8
	X-Large	58.6	Integrated	40,474.5	22,256.3	18,218.2	11,324.8	6,893.4	29,149.7	11,324.8
8. Nonwoven manufacturing	Small	10.4	N.A.	2,941.1	1,510.3	1,430.8	1,033.3	397.4	1,907.7	1,152.6
	Medium	23.6	N.A.	15,681.6	3,326.4	12,355.2	11,167.2	1,188.0	4,514.4	2,851.2
9. Felted fabric processing	Small	0.9	N.A.	3,546.0	1,154.5	2,391.5	1,608.0	783.4	1,937.9	1,360.7
	Medium	2.0	N.A.	4,709.0	1,533.2	3,175.8	2,409.3	766.6	2,299.8	1,533.1

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[1] In 1979 dollars.

Table VI-7. The textile industry, representative existing model plants' investment characteristics - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
		(kkg)		------------------------------1,000 dollars 1/------------------------------						
1. Wool scouring	Small	16.2	Commission	334.8	149.3	185.5	104.1	81.4	230.7	148.4
	Large	81.0	Commission	7,162.8	4,802.3	2,360.5	1,383.7	976.8	5,779.1	3,011.7
2. Wool finishing	Small	3.1	Integrated	3,519.6	915.1	2,604.5	1,372.6	1,231.9	2,147.0	1,689.4
	Medium	18.6	Integrated	26,584.8	5,016.0	21,568.8	13,041.6	8,527.2	13,543.2	11,536.8
	Large	37.3	Integrated	52,867.5	9,975.0	42,892.5	25,935.0	16,957.5	26,932.5	22,942.5
3. (Omitted)										
4. Woven fabric finishing										
A. Simple processing	Small	2.4	Commission	528.3	160.8	367.5	229.7	137.8	298.6	170.0
			Own fabric	879.2	262.6	616.6	251.2	365.4	628.0	456.7
			Integrated	1,885.6	529.7	1,355.9	974.6	381.3	911.0	533.9
	Medium	12.3	Commission	1,415.2	909.8	505.4	151.6	353.8	1,263.6	549.2
			Own fabric	5,044.7	1,121.1	3,923.6	3,004.3	919.3	2,040.4	1,479.8
			Integrated	8,906.4	2,544.7	6,361.7	2,429.0	3,932.7	6,477.4	5,552.1
	Large	49.3	Commission	8,225.3	5,287.7	2,937.6	881.3	2,056.3	7,344.0	3,525.1
			Own fabric	21,580.0	4,795.5	16,784.5	12,228.7	4,555.8	9,351.3	6,953.6
			Integrated	25,837.8	14,575.2	11,262.6	331.2	10,931.4	25,506.6	17,954.0
B. Complex processing	Small	9.7	Commission	1,167.2	456.1	711.1	442.7	268.3	724.5	424.0
			Own fabric	3,436.8	1,026.6	2,410.2	1,678.2	732.0	1,758.6	1,410.4
			Integrated	8,473.8	1,842.1	6,631.7	3,223.8	3,407.9	5,250.0	4,697.4
	Medium	23.3	Commission	3,474.4	1,647.4	1,827.1	1,048.3	778.8	2,426.1	1,126.2
			Own fabric	8,762.3	1,820.7	6,941.6	5,075.3	1,866.3	3,687.0	2,776.6
			Integrated	20,483.3	3,034.6	17,448.7	10,241.6	7,207.1	10,241.6	9,862.3
	Large	116.3	Commission	28,563.8	13,543.2	15,020.6	8,618.4	6,402.2	21,422.9	10,095.8
			Own fabric	45,322.2	9,417.6	35,904.6	24,721.2	11,183.4	20,601.0	15,892.2
			Integrated	65,717.2	18,884.3	46,832.9	16,168.1	30,214.8	49,099.1	46,228.6
C. Desizing	Small	21.4	Commission	2,463.6	1,407.7	1,055.8	58.7	997.2	2,404.9	1,337.4
			Own fabric	10,598.7	3,729.2	6,869.5	5,260.1	1,609.4	5,338.6	2,590.8
			Integrated	17,664.5	2,617.0	15,047.5	8,832.2	6,215.3	8,832.2	8,701.4
	Medium	53.6	Commission	9,547.2	5,304.0	4,243.2	3,182.4	1,060.8	6,364.8	2,291.3
			Own fabric	23,448.4	8,337.2	15,111.2	10,838.4	4,272.8	12,610.0	6,878.2
			Integrated	41,032.5	9,358.3	31,674.2	17,996.7	13,677.5	23,035.8	18,716.6
	Large	178.5	Own fabric	81,259.2	28,892.2	52,367.0	35,212.3	17,154.7	46,046.9	26,183.5
			Integrated	130,893.8	37,522.9	93,370.9	51,921.2	41,449.7	78,972.6	66,755.9

1/ In 1979 dollars

Continued . . .

Table VI-7 (Con'd)

Subcategory	Size	Daily capacity	Type plant	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
		(kkg)		----------------------------1,000 dollars 1/----------------------------						
5. Knit fabric finishing										
A. Simple processing	Small	1.6	Commission	493.9	191.5	302.4	211.7	90.7	282.2	177.4
			Integrated	1,170.3	245.0	925.3	672.2	253.1	498.1	375.6
	Medium	19.3	Commission	3,068.2	1,468.8	1,599.4	1,207.7	391.7	1,860.5	1,129.3
			Integrated	20,790.0	5,613.3	15,176.7	9,230.8	5,945.9	11,559.2	8,773.4
	Large	32.2	Commission	5,100.8	2,441.9	2,658.9	2,007.7	651.2	3,093.1	2,116.3
			Integrated	31,075.8	6,215.2	24,860.6	11,933.1	12,927.5	19,142.7	16,035.1
B. Complex processing	Small	7.7	Commission	2,926.1	875.5	2,050.6	1,728.0	322.6	1,198.1	718.9
			Integrated	7,534.7	1,902.0	5,632.7	4,272.1	1,360.6	3,262.6	2,311.6
	Medium	18.5	Commission	2,914.8	1,395.4	1,519.4	1,147.3	372.1	1,767.5	1,072.9
			Integrated	21,704.8	5,225.3	16,479.5	10,731.8	5,747.7	10,973.0	8,360.4
	Large	46.3	Commission	7,823.8	3,745.4	4,078.4	3,079.6	998.8	4,744.2	3,246.1
			Integrated	52,858.6	31,914.6	20,944.0	199.5	20,744.5	52,659.1	28,922.6
C. Hosiery products	Small	2.5	Own hosiery	1,763.8	337.2	1,426.6	959.7	466.9	804.1	648.5
			Integrated	5,290.6	1,058.1	4,232.5	2,404.8	1,827.7	2,885.8	2,491.4
	Medium	5.5	Own hosiery	10,304.1	1,999.3	8,304.8	5,505.8	2,799.0	4,798.3	3,906.3
			Integrated	3,570.5	1,415.9	2,154.6	1,415.9	738.7	2,154.6	1,588.2
	Large	12.6	Own hosiery	19,224.0	6,536.2	12,687.8	8,074.1	4,613.7	11,149.9	8,227.9
			Integrated	8,331.1	3,303.7	5,027.4	3,303.7	1,723.7	5,027.4	3,705.9
6. Carpet finishing	Small	8.9	Integrated	4,856.9	1,131.7	3,725.2	1,839.1	462.1	1,593.8	1,028.0
	Medium	48.6	Integrated	12,629.2	2,788.2	9,841.0	8,135.2	1,705.8	4,494.0	3,345.9
	Large	121.5	Integrated	29,432.8	8,490.2	20,942.6	17,999.3	2,943.3	11,433.5	5,773.4
7. Stock & harn finishing	Small	4.3	Commission	215.8	143.9	71.9	32.0	40.0	183.9	103.9
			Own yarn	1,715.7	259.4	1,456.3	817.9	638.4	897.8	794.0
			Integrated	1,108.8	158.4	950.4	760.3	190.1	348.5	269.3
	Medium	9.8	Commission	708.6	428.9	279.7	195.8	83.9	512.8	255.5
			Own yarn	4,541.8	1,682.1	2,859.7	2,270.9	588.8	2,270.9	1,598.1
			Integrated	2,943.8	420.6	2,523.2	2,018.6	504.6	925.2	714.9
	Large	23.5	Commission	1,402.2	848.7	553.5	387.4	166.1	1,014.8	505.5
			Own yarn	8,219.4	2,548.0	5,671.4	4,438.5	1,232.9	3,780.9	2,761.7
			Integrated	7,840.8	2,613.6	5,227.2	2,787.8	2,439.4	5,053.0	3,659.0
	X-Large	58.6	Own yarn	20,357.4	6,310.8	14,046.6	10,993.0	3,053.6	9,364.4	6,840.1
			Integrated	22,564.1	7,384.6	15,179.5	9,435.9	5,743.6	13,128.2	9,435.9
8. Nonwoven manufacturing	Small	10.4	N.A.	3,696.2	1,334.7	2,361.5	1,129.4	1,232.1	2,566.8	1,899.4
	Medium	23.6	N.A.	11,294.0	4,419.4	6,874.6	4,419.4	2,455.2	6,874.6	4,664.9
	Large	56.7	N.A.	25,668.0	10,044.0	15,624.0	10,044.0	5,580.0	15,624.0	10,602.0
9. Felted fabric processing	Small	0.9	N.A.	3,546.0	1,154.5	2,391.5	1,608.1	783.4	1,937.9	1,360.7
	Medium	4.4	N.A.	5,146.8	1,298.3	3,848.5	2,550.2	1,298.3	2,596.6	1,687.8
	Large	10.7	N.A.	683.4	163.2	520.2	234.6	285.6	448.8	367.2

Table VI-8. The textile industry, new source model plants investment characteristics-direct dischargers (NSPS)

Subcategory	Size	Daily capacity	Type plant	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
		(kkg)		------------------------------1,000 dollars[1/]------------------------------						
1. Omitted										
2. Wool finishing	Medium	18.6	Integrated	23,580.5	16,169.5	7,411.0	1,684.3	5.726.7	21,896.2	7,343.6
3. Omitted										
4. Woven fabric finishing										
A. Simple Processing	Medium	29.6	Commission	9,925.9	7,246.8	2,679.1	1,537.2	1,141.9	8,388.7	1,866.6
			Own fabric	24,466.5	17,413.9	7,052.6	4,063.2	2.989.4	20,403.3	4,730.9
			Integrated	45,466.2	33,930.0	11,536.2	5,202.6	6,333.6	40,263.6	9,726.6
B. Complex Processing	Medium	116.3	Commission	40,613.4	29,430.0	11,183.4	5,101.2	6,082.2	35,512.2	9,025.2
			Own fabric	111,834.0	76,518.0	35,316.0	16,480.8	18,835.2	95,353.2	26,487.0
			Integrated	170,070.5	111,767.1	58,303.4	38,744.1	19,559.3	131,326.4	30,736.0
C. Desizing	Medium	53.6	Commission	20,155.2	15,912.0	4,243.2	3,150.0	1,060.8	16,972.8	2,652.0
			Own fabric	51,326.0	36,475.3	14,850.7	3,908.0	10,942.7	47,418.0	14,590.0
			Integrated	80.625.2	61,188.8	19,436.4	9,357.6	10,078.8	71,267.6	16,197.7
5. Knit fabric finishing										
A. Simple processing	Medium	32.2	Commission	12.426.5	9,767.5	2,659.0	20,029.4	629.6	10,397.1	1.606.4
			Integrated	49,843.7	27,576.0	22,267.7	12,409.2	9,858.5	37,434.5	12,616.1
B. Complex processing	Medium	18.5	Commission	8,959.1	7,099.2	1,859.9	780.9	1,079.0	8.178.2	1,789.0
			Integrated	30,668.0	20,097.0	10,571.0	4,823.2	5,747.8	25,844.8	7,757.5
C. Hosiery products	Medium	5.5	Own hosiery	8.151.0	3,075.8	5,075.2	2,922.0	2,153.2	5,229.0	2,460.7
6. Carpet finishing	Small	20.2	Integrated	31,199.1	19,199.5	11,999.6	10,559.9	1,439.9	20,639.4	3,359.9
7. Stock & yarn finishing	Medium	23.5	Commission	4,009.3	3,729.6	279.7	195.8	83.9	3,813.5	456.8
			Own yarn	14,630.6	9,041.4	5,589.2	4,438.6	1,150.7	10.192.1	2,054.9
8. Nonwoven manufacturing	Medium	23.6	N.A.	33.739.2	21,384.0	12,355.2	11,167.2	1,188.0	22,572.0	3,326.4
9. Felted fabric processing	Medium	4.4	N.A.	17,758.9	13,910.4	3,848.5	1,530.1	2,318.4	16,228.8	3,709.4

1/ In 1979 dollars.

Table VI-9. The textile industry, new source model plants' investment characteristics-indirect dischargers (PSNS)

Subcategory	Size	Daily capacity	Type plant	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
		(kkg)		-------------------------------1,000 dollars[1/]						--------------------------------
1. Omitted										
2. Wool finishing	Medium	18.6	Integrated	45,645.6	24,076.8	21,568.8	13,041.6	8,527.2	32,604.0	10.934.9
3. Omitted										
4. Woven fabric finishing										
A. Simple processing	Medium	12.3	Commission	3,032.6	2,527.2	505.4	151.6	353.8	2,881.0	606.5
			Own fabric	8,407.8	6,726.2	1,681.6	504.5	1,177.1	7,903.3	1,849.7
			Integrated	23,711.9	17,350.2	6,361.7	3,123.0	3,238.7	20,588.9	4,973.8
B. Complex processing	Medium	23.3	Commission	5,720.9	3,893.8	1,827.1	1,048.3	778.8	4,672.6	1,168.2
			Own fabric	21,735.0	14,793.5	6,941.5	4,597.3	2,344.2	17,137.7	3,168.3
			Integrated	47.794.2	30,345.6	17,448.6	12,138.1	5,310.5	35.656.1	8,345.0
C. Desizing	Medium	53.6	Commission	20,155.2	15,912.0	4,243.2	3,182.4	1,060.8	16,972.8	1,219.9
			Own fabric	51,586.5	36,475.3	15,111.2	9,744.1	5,367.1	41,842.4	9,014.6
			Integrated	92,862.8	61.188.7	31,674.1	21,595.9	10,078.2	71,266.9	16,197.1
5. Knit fabric finishing										
A. Simple processing	Medium	19.3	Commission	7,474.6	5,875.2	1,599.4	391.7	1,207.7	7,082.9	1,795.2
			Integrated	31,808.6	16,632.0	15,176.6	9,563.4	5,613.2	22,245.2	7,276.4
B. Complex processing	Medium	18.5	Commission	7,721.0	6,201.6	1,519.4	1,147.3	372.1	6,573.7	992.3
			Integrated	36,576.5	20,097.0	16,479.5	4,823.3	11,656.2	31,753.2	13,666.0
C. Hosiery products	Large	.12.6	Own hosiery	20,377.4	7,689.6	12,687.8	8,074.0	4,613.8	20,377.4	5,382.7
			Integrated	13,645.8	8,618.4	5,027.4	3,303.7	1,723.7	10,342.1	2,585.5
6. Carpet finishing	Medium	48.6	Integrated	22,962.2	13,121.2	9,841.0	2,296.2	7,544.8	20,666.0	8,856.9
7. Stock & yarn finishing	Medium	9.8	Commision	4,009.3	3,729.6	279.7	195.8	83.9	3,813.5	456.8
			Own yarn	7,485.7	4,626.0	2,859.7	2,271.0	588.7	5,214.7	1,051.3
8. Nonwoven manufacturing	Large	56.7	N.A.	58,824.0	43,200.0	15,624.0	10,044.0	5,580.0	48,780.0	9,900.0
9. Felted fabric processing	Medium	4.4	N.A.	17,758.9	13.910.4	3,848.5	1,530.1	2,318.4	16,228.8	3.709.4

1/ In 1979 dollars.

liabilities. The difference between current assets and current liabilities comprises the firm's operating capital or, as it is sometimes called, net working capital. Net working capital represents the quantity of capital that the firm is required to maintain for daily cash balances. Current assets represent those assets a firm maintains that could be converted to cash with relative ease. Current assets include such items as raw materials inventory, finished product inventory and accounts receivable.

Current liabilities represent those liabilities a firm maintains on short period demand and includes short term notes and accounts and wages payable.

As illustrated in the tables, the net working capital varied both with the type of mill (finishing vs. integrated) and the nature of the textile material input. The integrated mills, which accomplish a full range of textile operations, have a very high requirement for working capital. On the other hand, the finishing plants have relatively low requirements. Additionally, mills purchasing fabric for processing have a higher working capital requirement than those mills purchasing yarn for finishing.

3. Total Investment

Two measures of the models' total investments are provided. First, total assets--the total of both fixed and current assets is provided. Second, the total invested capital--the book value of debt and equity which was computed as the sum of net working capital and fixed assets is shown. While each represents a measure of the models' investment, total assets is used in the subsequent analysis to determine the returns on investment (or total assets).

4. Salvage Value

The salvage value for nonconforming uses represents the amount of money that could be recovered should a mill cease operation. This will vary from mill to mill, depending on the location and the age of the facility, its condition, and the usability of its equipment.

As described earlier in the report, only a limited market exists for certain types of used machinery and equipment; thus, most of a closing plant's equipment would be scrapped.

Salvage value is represented by the sum of the net working capital and the scrap or salvage value of the fixed assets. In developing model plants, the salvage values of fixed assets were determined from estimates obtained from industry surveys. The values vary widely between model plants.

E. Sales and Cost Characteristics

Model plant sales and costs' characteristics were developed from the industry survey responses, conversations with industry personnel, and from information available in published sources. Financial profiles depicting sales and costs' characteristics were developed for each of the model plants. Due to the number of tables required to depict each model's profile, the tables are presented in Appendix B of this report. The profiles of the existing direct and indirect discharger models are very similar to each other with the principal differences due to differences in model size and utilization rates. Each major financial component is discussed below.

1. Annual Sales

Annual sales of the model plants were determined from the production characteristics described in Tables VI-2, VI-3, VI-4 and VI-5 as well as from estimates of final product prices. Prices were estimated primarily from the industry surveys and as discussed previously, were based on differences in product mixes as produced by the various types and sizes of models in each of the subcategories. Prices generally varied within subcategories between different size and type models. This variation reflects differences in products and markets that can be expected in the industry.

2. Textile and Fiber Materials Costs

The costs of textile and fiber materials used as inputs to the models production varied widely between both subcategories and types of mills within subcategories. The commission models reflected no raw material input costs since they were assumed to be processing textile materials owned by other mills on a commission or fee basis. The integrated models reflected relatively low costs in all subcategories as their inputs were assumed to be yarn and, in some cases, fiber. The material costs for the finishing mills (own fabrics) were appreciably higher than the other models as they represented the purchase of semi-processed fabrics and apparel.

3. Labor Costs

Labor costs were developed from the industry surveys and reflect varying wages for different types and sizes of mills. The labor costs include costs for both direct and indirect labor.

In the existing mills categories, the highest labor costs occurred among the commission models, amounting to between 35 and 40 percent of sales. Since these mills incurred little material input costs, labor costs represented their major cost component. The labor costs of the finishing mills (own fabric) ranged between 10 to 20 percent of sales. Those of the integrated mills were generally higher, with most being about 20 to 30 percent of sales.

For the new source models, the labor costs were approximately 15 percent lower than those of the corresponding existing models. These lower costs reflect the increased operating efficiencies expected of these new mills.

4. Other Costs

These costs include expenditures for dyes and finsihing materials and other miscellaneous costs, including administrative and selling expenses. They varied considerably for different models and were generally the highest (as a percent of sales) in the commission mills, ranging between 15 to 25 percent for those models.

5. Depreciation and Interest Costs

The model plants' depreciation and interest costs were developed from the industry surveys and published sources. Depreciation and interest both expressed as a percent of sales are shown in Tables VI-10 and VI-11 for existing direct and indriect discharging model plants, respectively. With a few exceptions, the costs were generally the same for both the direct and indirect discharging models. Depreciation as a percent of sales ranged from a low of 0.4 percent for the medium integrated yarn mill (7) to a high of 5.1 for the large wool scouring plant (direct discharger)(1). Depreciation for the remaining models generally fell in the range of 1 to 3 percent of the models' sales. Interest costs expressed as a percent of sales varied considerably less than depreciation. A number of model plants incurred no interest costs. The model plants with the highest interest costs were the large commission woven fabric finishing models (4a,c) with an interest cost of 2.7 percent of the models' sales. The rates of the majority of models varied generally between 1.0 and 2.0 percent.

In the case of the new source models, the depreciation as a percent of sales varied from 1.0 to 13.3 percent. As expected, interest costs as a percent of sales for the new source models were significantly greater than those of the existing source models because of the greater debt load associated with a new facility. The new source models' interest and depreciation expenditures are summarized in Tables VI-12 and VI-13.

F. Model Plant Income and Annual Cash Flow Characteristics

For each model plant, the following were computed: its after-tax income, return on sales, return on total assets, and annual cash flow (dollar amount as well as percent of sales, and as a percent of total assets). These are presented in Table VI-14 for the existing direct discharging models, Table VI-15 for the existing indirect discharging models, and Tables VI-16 and VI-17 for the new source models. It should be noted that these incomes and annual cash flows are based on 1979 dollars and represent "base cases". The existing direct discharging models reflect BPT controls (except as noted in Chapter VII) while the indirect models reflect no controls (pretreatment).

Table IV-10. The textile industry, representative existing model plants' depreciation and interest - direct dischargers

Subcategory	Size	Daily capacity	Type plant	Depreciation	Depreciation as a % of sales	Interest	Interest as a % of sales
		(kkg)		($000)	(%)	($000)	(%)
1. Wool scouring	Small	16.2	Commission	41.6	2.6	0.0	0.0
	Medium	35.6	Commission	107.3	3.2	0.0	0.0
	Large	81.0	Commission	415.1	5.1	8.2	0.1
2. Wool finishing	Small	7.4	Integrated	231.2	1.4	132.1	0.8
	Medium	18.6	Integrated	235.8	0.7	909.5	2.7
	Large	37.3	Integrated	1,396.6	1.4	1,596.0	1.6
3. (Omitted)							
4. Woven fabric finishing A. Simple	Small	5.4	Commission	21.7	1.3	18.4	1.1
			Own fabric	49.8	1.0	5.0	0.1
			Integrated	129.4	1.4	129.4	1.4
	Medium	29.6	Commission	307.4	3.5	8.8	0.1
			Own fabric	406.3	1.4	0.0	0.0
			Integrated	1,221.5	2.7	452.4	1.0
	Large	73.9	Commission	789.5	4.3	495.7	2.7
			Integrated	2,089.9	2.1	0.0	0.0
B. Complex	Small	23.3	Commission	241.9	3.5	7.0	0.1
			Integrated	1,024.2	2.7	379.3	1.0
	Medium	116.3	Commission	1,373.4	3.5	39.2	0.1
			Own fabric	2.589.8	2.2	0.0	0.0
			Integrated	2,986.3	2.1	284.4	0.2
	Large	193.8	Integrated	6,095.9	2.1	580.6	0.2
C. Desizing	Small	21.4	Commission	221.3	3.5	6.4	0.1
			Own fabric	292.3	1.4	0.0	0.0
			Integrated	939.6	2.7	348.0	1.0
	Medium	53.6	Commission	912.2	4.3	572.9	2.7
			Own fabric	1.146.4	2.2	416.9	0.8
			Integrated	1,511.7	2.1	0.0	0.0
	Large	178.5	Own fabric	3,972.7	2.2	0.0	0.0
			Integrated	3,212.9	2.1	306.0	0.2
5. Knit fabric finishing A. Simple	Small	8.0	Commission	125.1	4.0	18.8	0.6
			Integrated	301.8	2.0	120.7	0.8
	Medium	32.2	Commission	510.1	4.7	130.2	1.2
			Integrated	1,447.7	2.1	68.9	0.1
	Large	160.8	Commission	2,719.2	4.7	694.3	1.2
			Integrated	6,843.0	2.1	325.9	0.1
B. Complex	Small	7.7	Commission	121.3	4.0	18.2	0.6
			Integrated	329.2	2.0	131.7	0.8
	Medium	18.5	Integrated	844.1	2.1	281.4	0.7
	Large	30.9	Commission	521.6	4.7	133.2	1.2
			Integrated	1,389.8	2.1	66.2	0.1
C. Hosiery	Small	2.5	Own hosiery	19.4	0.5	0.0	0.0
			Integrated	458.4	4.6	0.0	0.0
	Medium	5.5	Own hosiery	138.4	0.9	0.0	0.0
6. Carpet finishing	Small	20.2	Integrated	348.6	1.6	174.3	0.8
	Medium	48.6	Integrated	528.0	1.1	672.0	1.4
	Large	121.5	Integrated	809.2	1.3	684.7	1.1
7. Stock & yarn finishing	Small	9.8	Commission	116.4	4.7	19.8	0.8
			Own yarn	177.6	1.1	0.0	0.0
			Integrated	204.0	2.8	36.4	0.5
	Medium	23.4	Own yarn	361.7	2.2	98.6	0.6
			Integrated	85.0	0.4	340.0	1.6
	Large	39.1	Own yarn	607.4	2.2	165.7	0.6
			Integrated	935.5	1.9	689.3	1.4
	X-large	58.6	Integrated	1,398.2	1.9	1,030.3	1.4
8. Nonwoven manufacturing	Small	10.4	N.A.	198.7	2.5	111.3	1.4
	Medium	23.6	N.A.	285.1	1.2	190.1	0.8
9. Felted fabric finishing	Small	0.9	N.A.	115.4	2.8	74.2	1.8
	Medium	2.0	N.A.	153.3	2.8	125.9	2.3

Table IV-11. The textile industry, representative existing model plants' depreciation and interest - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Depreciation	Depreciation as a % of sales	Interest	Interest as a % of sales
		(kkg)		($000)	(%)	($000)	(%)
1. Wool scouring	Small	16.2	Commission	23.5	2.6	0.9	0.1
	Large	81.0	Commission	260.5	3.2	0.0	0.0
2. Wool finishing	Small	3.1	Integrated	126.7	1.8	84.5	1.2
	Medium	18.6	Integrated	702.2	1.4	802.6	1.6
	Large	37.3	Integrated	1,396.6	1.4	1,596.0	1.6
3. (Omitted)							
4. Woven fabric finishing A. Simple	Small	2.4	Commission	10.0	1.3	8.4	1.1
			Own fabric	22.8	1.0	2.3	0.1
			Integrated	59.3	1.4	59.3	1.4
	Medium	12.3	Commission	117.9	3.5	6.7	0.2
			Own fabric	246.6	2.2	123.3	1.1
			Integrated	370.1	1.6	393.3	1.7
	Large	49.3	Commission	842.2	4.3	528.7	2.7
			Own fabric	1,055.0	2.2	383.6	0.8
			Integrated	1,391.3	2.1	0.0	0.0
B. Complex	Small	9.7	Commission	94.0	3.5	5.4	0.2
			Own fabric	196.4	2.2	98.2	1.1
			Integrated	294.7	1.6	313.2	1.7
	Medium	23.3	Commission	209.6	3.5	6.0	0.1
			Own fabric	318.6	1.4	0.0	0.0
			Integrated	1,024.2	2.7	379.3	1.0
	Large	116.3	Commission	1,723.7	3.5	337.2	1.7
			Own fabric	2,589.8	2.2	0.0	0.0
			Integrated	3,172.6	2.1	302.2	0.2
C. Desizing	Small	21.4	Commission	205.3	3.5	5.9	0.1
			Own fabric	274.8	1.4	0.0	0.0
			Integrated	883.2	2.7	327.1	1.0
	Medium	53.6	Commission	912.2	4.3	572.9	2.7
			Own fabric	1,146.4	2.2	416.9	0.8
			Integrated	1,511.7	2.1	0.0	0.0
	Large	178.5	Own fabric	3,972.7	2.2	0.0	0.0
			Integrated	4,581.3	2.1	436.3	0.2
5. Knit fabric finishing A. Simple	Small	1.6	Commission	40.3	4.0	11.1	1.1
			Integrated	40.8	1.5	13.6	0.5
	Medium	19.3	Commission	306.8	4.7	78.3	1.2
			Integrated	873.2	2.1	291.1	0.7
	Large	32.2	Commission	510.1	4.7	130.2	1.2
			Integrated	1,305.2	2.1	62.2	0.1
B. Complex	Small	7.7	Commission	184.3	4.0	21.8	0.5
			Integrated	292.6	2.0	117.0	0.8
	Medium	18.5	Commission	291.5	4.7	74.4	1.2
			Integrated	844.1	2.1	281.4	0.7
	Large	46.3	Commission	782.4	4.7	199.8	1.2
			Integrated	2,094.4	2.1	99.7	0.1
C. Hosiery	Small	2.5	Own hosiery	77.8	1.5	25.9	0.5
			Integrated	144.3	1.5	0.0	0.0
	Medium	5.5	Own hosiery	138.4	0.9	0.0	0.0
			Integrated	184.7	1.5	36.9	0.3
	Large	12.6	Own hosiery	346.0	0.9	0.0	0.0
			Integrated	430.9	1.5	86.2	0.3
6. Carpet finishing	Small	8.9	Integrated	150.9	1.6	75.4	0.8
	Medium	48.6	Integrated	393.6	1.2	459.2	1.4
	Large	121.5	Integrated	735.3	1.3	622.6	1.1

Table IV-11. The textile industry, representative existing model plants' depreciation and interest - indirect dischargers (continued)

Subcategory	Size	Daily capacity	Type plant	Depreciation	Depreciation as a % of sales	Interest	Interest as a % of sales
		(kkg)		($000)	(%)	($000)	(%)
7. Stock & yarn finishing	Small	4.3	Commission	13.6	1.7	5.6	0.7
			Own yarn	59.9	1.5	27.9	0.7
			Integrated	88.7	2.8	15.8	0.5
	Medium	9.8	Commission	98.8	5.3	52.2	2.8
			Own yarn	109.3	1.3	58.9	0.7
			Integrated	204.0	2.8	36.4	0.5
	Large	23.5	Commission	180.8	4.9	73.8	2.0
			Own yarn	361.7	2.2	98.6	0.6
			Integrated	69.7	0.4	278.8	1.6
	X-large	58.6	Own yarn	1.506.4	3.7	1,302.9	3.2
			Integrated	164.2	0.4	656.4	1.6
8. Nonwoven manufacturing	Small	10.4	N.A.	256.7	2.5	143.3	1.4
	Medium	23.6	N.A.	736.6	3.0	233.9	1.0
	Large	56.7	N.A.	1.729,8	3.1	0.0	0.0
9. Felted fabric finishing	Small	0.9	N.A.	115.4	2.8	74.2	1.8
	Medium	4.4	N.A.	194.3	2.1	0.0	0.0
	Large	10.7	N.A.	24.5	1.2	10.2	0.5

Table VI-12. The textile industry, new source model plants depreciation and interest direct dischargers (NSPS)

Subcategory	Size	Daily capacity	Type plant	Depreciation		Interest	
				Amount	% of sales	Amount	% of sales
		(KKg)		($000)	(%)	($000)	(%)
1. Omitted							
2. Wool finishing	Medium	18.6	Integrated	1,078.0	3.2	471.6	1.4
3. Omitted							
4. Woven fabric finishing							
a. Simple processing	Medium	29.6	Commission	483.1	5.5	175.7	2.0
			Own fabric	1,160.9	4.0	428.5	1.5
			Integrated	2,262.0	5.0	845.5	1.9
b. Complex processing	Medium	116.3	Commission	1,962.0	5.0	745.8	1.9
			Own fabric	5,101.2	4.3	2,002.4	1.7
			Integrated	7,451.2	5.3	2,757.8	2.0
c. Desizing	Medium	53.6	Commission	1,060.8	5.0	356.4	1.7
			Own fabric	2,431.7	4.7	995.8	1.9
			Integrated	4,079.3	5.7	1,496.6	2.1
5. Knit fabric finishing							
a. Simple processing	Medium	32.2	Commission	651.1	6.0	218.4	2.0
			Integrated	1,838.4	2.7	564.6	0.8
b. Complex processing	Medium	18.5	Commission	473.3	6.7	171.7	2.4
			Integrated	1,339.8	3.3	542.8	1.4
c. Hosiery products	Medium	5.5	Own hosiery	205.1	1.3	109.8	0.7
6. Carpet finishing	Small	20.2	Integrated	1,279.9	2.7	433.4	0.9
7. Stock & yarn finishing	Medium	23.5	Commission	248.6	13.3	80.6	4.3
			Own yarn	602.8	3.7	214.1	1.3
8. Nonwoven manufacturing	Medium	23.6	N.A.	1,425.6	6.0	474.0	2.0
9. Felted fabric processing	Medium	4.4	N.A.	927.4	10.0	340.8	3.7

Table VI-13. The textile industry, new source model plants depreciation and interest indirect dischargers (PSNS)

Subcategory	Size	Daily capacity	Type plant	Depreciation		Interest	
				Amount	% of sales	Amount	% of sales
		(KKg)		($000)	(%)	($000)	(%)
1. Omitted							
2. Wool finishing	Medium	18.6	Integrated	1,605.1	3.2	958.6	1.9
3. Omitted							
4. Woven fabric finishing							
a. Simple processing	Medium	12.3	Commission	168.5	5.0	60.5	1.8
			Own fabric	448.4	4.0	166.0	1.5
			Integrated	1,156.7	5.0	432.4	1.9
b. Complex processing	Medium	23.3	Commission	259.6	4.3	98.2	1.6
			Own fabric	986.3	4.3	359.9	1.6
			Integrated	2,023.1	5.3	748.8	2.0
c. Desizing	Medium	53.6	Commission	1,060.8	5.0	356.4	1.7
			Own fabric	2,431.7	4.7	878.6	1.7
			Integrated	4,079.3	5.7	1,496.6	2.1
5. Knit fabric finishing							
a. Simple processing	Medium	19.3	Commission	391.7	6.0	148.8	2.3
			Integrated	1,108.8	2.7	467.2	1.1
b. Complex processing	Medium	18.5	Commission	413.4	6.7	138.0	2.2
			Integrated	1,339.8	3.3	666.8	1.7
c. Hosiery products	Large	12.6	Own hosiery	512.6	1.3	427.9	1.1
			Integrated	574.6	2.0	217.2	0.8
6. Carpet finishing	Medium	48.6	Integrated	874.8	2.7	434.0	1.3
7. Stock & yarn	Medium	9.8	Commission	248.6	13.3	80.0	4.3
			Own yarn	308.4	3.7	109.6	1.3
8. Nonwoven manufacturing	Large	56.7	N.A.	2,880.0	6.0	1,024.4	2.1
9. Felted fabric processing	Medium	4.4	N.A.	927.4	10.0	340.8	3.7

Table VI-14. The textile industry, representative existing model plants' profitabilities and annual cash flows - direct dischargers

Subcategory	Size	Daily capacity	Type plant	After tax income	After tax returns		Annual cash flow		
					% of sales	% of total assets	Amount	% of sales	% of total assets
		(KKg)		($000)	(%)	(%)	($000)	(%)	(%)
1. Wool scouring	Small	16.2	Commission	-64.0	-4.0	-7.4	-22.4	-1.4	-2.6
	Medium	35.6	Commission	0.0	0.0	0.0	107.3	3.2	3.6
	Large	81.0	Commission	8[illegible]	1.0	1.2	500.3	6.1	6.9
2. Wool finishing	Small	7.4	Integrated	215.4	1.3	3.3	446.6	2.7	6.8
	Medium	18.6	Integrated	182.9	0.5	1.8	418.7	1.2	4.1
	Large	37.3	Integrated	3,143.4	3.2	5.9	4,540.0	4.6	8.6
3. Omitted									
4. Woven fabric finishing									
A. Simple	Small	5.4	Commission	24.8	1.5	3.4	46.5	2.8	6.4
			Own fabric	51.1	1.0	2.6	100.9	2.0	5.1
			Integrated	179.0	1.9	3.8	308.4	3.3	6.6
	Medium	29.6	Commission	133.1	1.5	2.6	440.5	5.0	8.6
			Own fabric	395.4	1.4	3.0	801.7	2.8	6.1
			Integrated	898.7	2.0	3.9	2,120.2	4.7	9.2
	Large	73.9	Commission	455.5	2.5	3.6	1,245.0	6.8	9.7
			Integrated	2,706.3	2.7	6.8	4,796.2	4.8	12.0
B. Complex	Small	23.3	Commission	108.8	1.6	2.7	350.7	5.1	8.7
			Integrated	756.6	2.0	3.7	1,780.8	4.7	8.7
	Medium	116.3	Commission	527.8	1.3	2.3	1,901.2	4.8	8.4
			Own fabric	1,926.3	1.6	3.9	4,516.1	3.8	9.0
			Integrated	3,858.8	2.7	5.0	6,845.1	4.8	8.9
	Large	193.8	Integrated	7,856.9	2.7	5.0	13,952.8	4.8	8.9
C. Desizing	Small	21.4	Commission	101.3	1.6	3.8	323.1	5.1	12.1
			Own fabric	289.8	1.4	3.1	582.1	2.8	6.2
			Integrated	695.8	2.0	4.3	1,635.4	4.7	10.2
	Medium	53.6	Commission	523.3	2.5	5.5	1,435.5	6.8	15.0
			Own fabric	975.9	1.9	4.2	2,122.3	4.1	9.1
			Integrated	1,962.9	2.7	6.8	3,474.6	4.8	12.1

continued . . .

Table VI-14 (continued)

Subcategory	Size	Daily capacity	Type plant	After tax income	After tax returns		Annual cash flow		
					% of sales	% of total assets	Amount	% of sales	% of total assets
		(KKg)		($000)	(%)	(%)	($000)	(%)	(%)
C. Desizing (continued)	Large	178.5	Own fabric	2,944.5	1.6	3.6	6,917.2	3.8	8.5
			Integrated	4,150.0	2.7	5.8	7,362.9	4.8	10.2
5. Knit fabric finishing									
A. Simple	Small	8.0	Commission	62.1	2.0	3.1	187.2	6.0	9.4
			Integrated	312.5	2.1	4.2	614.3	4.1	8.3
	Medium	32.2	Commission	247.8	2.3	4.9	757.9	7.0	14.9
			Integrated	1,769.0	2.6	5.1	3,216.7	4.7	9.3
	Large	160.8	Commission	1,237.6	2.1	4.6	3,956.8	6.8	14.6
			Integrated	8,289.5	2.5	5.1	15,132.5	4.6	9.3
B. Complex	Small	7.7	Commission	60.6	2.0	3.1	181.9	6.0	9.4
			Integrated	339.2	2.1	4.0	668.3	4.1	7.9
	Medium	18.5	Integrated	648.6	1.6	3.0	1,492.7	3.7	6.9
	Large	30.9	Commission	253.0	2.3	4.9	774.6	7.0	14.9
			Integrated	1,699.0	2.6	4.8	3,088.8	4.7	8.8
C. Hosiery	Small	2.5	Own hosiery	31.8	0.8	4.6	51.2	1.3	7.3
			Integrated	202.1	2.0	3.1	660.5	6.6	10.0
	Medium	5.5	Own hosiery	301.6	2.0	4.4	440.0	2.9	6.4
6. Carpet finishing	Small	20.2	Integrated	442.8	2.0	3.9	791.4	3.6	7.1
	Medium	48.6	Integrated	770.8	1.6	5.4	1,298.8	2.7	9.0
	Large	121.5	Integrated	1,430.9	2.3	4.4	2,240.1	3.6	6.9
7. Stock & yarn finishing	Small	9.8	Commission	49.1	2.0	5.1	165.5	6.7	17.4
			Own yarn	141.4	0.9	2.8	319.0	2.0	6.4
			Integrated	94.0	1.3	3.7	298.0	4.1	11.7
	Medium	23.5	Own yarn	312.2	1.9	3.5	673.9	4.1	7.6
			Integrated	386.5	1.8	4.0	471.5	2.2	4.9
	Large	39.1	Own yarn	511.2	1.9	3.4	1,118.6	4.1	7.5
			Integrated	1,003.0	2.0	3.7	1,938.5	3.9	7.2
	X-Large	58.6	Integrated	1,489.6	2.0	3.7	2,887.8	3.9	7.1

continued . . .

Table VI-14 (continued)

Subcategory	Size	Daily capacity	Type plant	After tax income	After tax returns		Annual cash flow		
					% of sales	% of total assets	Amount	% of sales	% of total assets
		(KKg)		($000)	(%)	(%)	($000)	(%)	(%)
8. Non-woven manufacturing	Small	10.4	N.A.	143.7	1.8	4.9	342.4	4.3	11.6
	Medium	23.6	N.A.	481.1	2.0	3.1	766.2	3.2	4.9
9. Felted fabric processing	Small	0.9	N.A.	197.4	4.8	5.6	312.8	7.6	8.8
	Medium	2.0	N.A.	105.0	1.9	2.2	258.3	4.7	5.5

Table VI-15. The textile industry, representative existing model plants' profitabilities and annual cash flows - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	After tax income	After tax returns		Annual cash flow		
					% of sales	% of total assets	Amount	% of sales	% of total assets
		(KKg)		($000)	(%)	(%)	($000)	(%)	(%)
1. Wool scouring	Small	16.2	Commission	28.3	3.1	8.5	51.8	5.7	15.5
	Large	81.0	Commission	142.3	1.7	2.0	402.8	4.9	5.6
2. Wool finishing	Small	3.1	Integrated	102.9	1.5	2.9	229.6	3.3	6.5
	Medium	18.6	Integrated	1,590.3	3.2	6.0	2,292.5	4.6	8.6
	Large	37.3	Integrated	3,143.4	3.2	5.9	4,540.0	4.6	8.6
3. Omitted									
4. Woven fabric finishing									
A. Simple	Small	2.4	Commission	11.4	1.5	2.2	21.4	2.8	4.1
			Own fabric	24.4	1.1	2.8	47.2	2.1	5.4
			Integrated	92.5	2.2	4.9	151.8	3.7	8.1
	Medium	12.3	Commission	59.8	1.8	4.2	177.7	5.3	12.6
			Own fabric	128.3	1.2	2.5	374.9	3.4	7.4
			Integrated	469.0	2.0	5.3	839.1	3.6	9.4
	Large	49.3	Commission	484.6	2.5	5.9	1,326.8	6.8	16.1
			Own fabric	899.7	1.9	4.2	1,954.7	4.1	9.1
			Integrated	1,807.9	2.7	7.0	3,199.2	4.8	12.4
B. Complex	Small	9.7	Commission	48.9	1.8	4.2	142.9	5.3	12.2
			Own fabric	106.0	1.2	3.1	302.4	3.4	8.8
			Integrated	377.3	2.0	4.5	672.0	3.6	7.9
	Medium	23.3	Commission	96.9	1.6	2.6	306.5	5.1	8.2
			Own fabric	314.2	1.4	3.6	632.7	2.8	7.2
			Integrated	756.7	2.0	3.7	1,780.9	4.7	8.7
	Large	116.3	Commission	870.3	1.8	3.0	2,594.0	5.3	9.1
			Own fabric	1,926.3	1.6	4.3	4,516.1	3.8	10.0
			Integrated	4,098.2	2.7	6.2	7,270.8	4.8	11.1
C. Desizing	Small	21.4	Commission	95.3	1.6	3.9	300.6	5.1	12.2
			Own fabric	273.6	1.4	2.6	548.4	2.8	5.2
			Integrated	655.2	2.0	3.7	1,538.4	4.7	8.7
	Medium	53.6	Commission	523.3	2.5	5.5	1,435.5	6.8	15.0
			Own fabric	975.9	1.9	4.2	2,122.3	4.1	9.1
			Integrated	1,962.9	2.7	4.8	3,474.6	4.8	8.5

continued . . .

Table VI-15 (continued)

Subcategory	Size	Daily capacity	Type plant	After tax income	After tax returns		Annual cash flow		
					% of sales	% of total assets	Amount	% of sales	% of total assets
		(KKg)		($000)	(%)	(%)	($000)	(%)	(%)
C. Desizing (continued)	Large	178.5	Own fabric	2,944.5	1.6	3.6	6,917.2	3.8	8.5
			Integrated	5,909.5	2.7	4.5	10,490.8	4.8	8.0
5. Knit fabric finishing									
A. Simple	Small	1.6	Commission	19.3	1.9	3.9	59.6	5.9	12.1
			Integrated	53.4	2.0	4.6	94.2	3.5	8.0
	Medium	19.3	Commission	156.8	2.5	5.1	463.6	7.1	15.1
			Integrated	670.3	1.6	3.2	1,543.5	3.7	7.4
	Large	32.2	Commission	247.9	2.3	4.9	758.0	7.0	14.9
			Integrated	1,596.6	2.6	5.1	2,901.8	4.7	9.3
B. Complex	Small	7.7	Commission	87.1	1.9	3.0	271.4	5.9	9.3
			Integrated	303.7	2.1	4.0	596.3	4.1	7.9
	Medium	18.5	Commission	149.9	2.4	5.1	441.4	7.2	15.1
			Integrated	648.6	1.6	3.0	1,492.7	3.7	6.9
	Large	46.3	Commission	369.8	2.2	4.7	1,152.2	6.9	14.7
			Integrated	2,550.6	2.6	4.8	4,645.0	4.7	8.8
C. Hosiery	Small	2.5	Own hosiery	49.4	1.0	2.8	127.2	2.5	7.2
			Integrated	175.0	1.8	3.3	319.3	3.3	6.0
	Medium	5.5	Own hosiery	301.6	2.0	2.9	440.0	2.9	4.3
			Integrated	351.6	2.9	9.8	536.3	4.4	15.0
	Large	12.6	Own hosiery	725.2	1.9	3.8	1,071.2	2.8	5.6
			Integrated	794.9	2.8	9.5	1,225.8	4.3	14.7
6. Carpet finishing	Small	8.9	Integrated	202.6	2.1	4.2	353.5	3.7	7.3
	Medium	48.6	Integrated	409.3	1.2	3.2	802.9	2.4	6.4
	Large	121.5	Integrated	936.2	1.7	3.2	1,672.0	3.0	5.7

continued . . .

Table VI-15 (continued)

Subcategory	Size	Daily capacity	Type plant	After tax income	After tax returns		Annual cash flow		
					% of sales	% of total assets	Amount	% of sales	% of total assets
		(KKg)		($000)	(%)	(%)	($000)	(%)	(%)
7. Stock & yarn finishing	Small	4.3	Commission	14.6	1.8	6.8	28.2	3.5	13.1
			Own yarn	86.0	2.2	5.0	145.9	3.7	8.5
			Integrated	47.9	1.5	4.3	136.6	4.3	12.3
	Medium	9.8	Commission	9.4	0.5	1.3	108.2	5.8	15.3
			Own yarn	119.2	1.4	2.6	228.5	2.7	5.0
			Integrated	94.0	1.3	3.2	298.0	4.1	10.1
	Large	23.5	Commission	61.9	1.7	4.4	242.7	6.6	17.3
			Own yarn	312.2	1.9	3.8	673.9	4.1	8.2
			Integrated	320.3	1.8	4.1	390.0	2.2	5.0
	X-Large	58.6	Own yarn	612.9	1.5	3.0	2,119.3	5.2	10.4
			Integrated	728.2	1.8	3.2	892.4	2.2	4.0
8. Non-woven manufacturing	Small	10.4	N.A.	180.0	1.8	4.9	436.7	4.3	11.8
	Medium	23.6	N.A.	394.1	1.6	3.5	1,130.7	4.6	10.0
	Large	56.7	N.A.	1,375.2	2.5	5.4	3,105.0	5.6	12.1
9. Felted fabric processing	Small	0.9	N.A.	197.4	4.8	5.6	312.8	7.6	8.8
	Medium	4.4	N.A.	164.5	1.8	3.2	359.3	3.9	7.0
	Large	10.7	N.A.	18.7	0.9	2.7	43.2	2.1	6.3

Table VI-16. The textile industry, new source model plants profitabilities and annual cash flow direct dischargers (NSPS)

Subcategory	Size	Daily capacity	Type plant	After tax income	After tax returns		Annual cash flow		
					% of sales	% of total assets	Amount	% of sales	% of total assets
		(KKg)		($000)	(%)	(%)	($000)	(%)	(%)
1. Omitted									
2. Wool finishing	Medium	18.6	Integrated	2,365.8	7.0	10.0	3,443.8	10.2	14.6
3. Omitted									
4. Woven fabric finishing									
a. Simple processing	Medium	29.6	Commission	616.9	7.0	6.2	1,100.0	12.5	11.1
			Own fabric	1,287.0	4.4	5.3	2,447.9	8.4	10.0
			Integrated	3,266.2	7.2	7.2	5,528.2	12.2	12.2
b. Complex	Medium	116.3	Commission	2,816.2	7.2	6.9	4,778.2	12.2	11.8
			Own fabric	5,238.7	4.5	4.7	10,339.9	8.8	9.2
			Integrated	9,649.9	6.9	5.7	17,101.1	12.2	10.1
c. Desizing	Medium	53.6	Commission	2,082.6	9.8	10.3	3,143.4	14.8	15.6
			Own fabric	2,368.0	4.5	4.6	4,799.7	9.2	9.4
			Integrated	5,125.0	7.1	6.4	9,204.3	12.8	11.4
5. Knit fabric finishing									
a. Simple processing	Medium	32.2	Commission	1,071.4	9.9	8.6	1,722.5	15.9	13.9
			Integrated	4,424.9	6.4	8.9	6,263.3	9.1	12.6
b. Complex	Medium	18.5	Commission	771.2	10.8	8.6	1,244.5	17.5	13.9
			Integrated	2,438.5	6.1	8.0	3,778.3	9.4	12.3
c. Hosiery products	Medium	5.5	Own hosiery	1,052.6	6.8	12.9	1,257.7	8.2	15.4
6. Carpet finishing	Small	20.2	Integrated	2,910.7	6.1	9.3	4,190.6	8.7	13.4
7. Stock & yarn finishing	Medium	23.5	Commission	122.1	6.5	3.0	370.7	19.9	9.2
			Own yarn	983.4	6.0	6.7	1,586.2	9.6	10.8
8. Nonwoven manufacturing	Medium	23.6	N.A.	1,527.5	6.4	4.5	2,953.1	12.4	8.8
9. Felted fabric processing	Medium	4.4	N.A.	321.6	3.5	1.8	1,249.5	13.5	7.0

Table VI-17. The textile industry, new source model plants profitabilities and annual cash flow indirect dischargers (PSNS)

Subcategory	Size	Daily capacity	Type plant	After tax income	After tax returns		Annual cash flow		
					% of sales	% of total assets	Amount	% of sales	% of total assets
		(KKg)		($000)	(%)	(%)	($000)	(%)	(%)
1. Omitted									
2. Wool finishing	Medium	18.6	Integrated	4,146.9	8.3	9.1	5,752.0	11.5	12.6
3. Omitted									
4. Woven fabric finishing									
a. Simple processing	Medium	12.3	Commission	341.7	10.1	11.3	510.2	15.1	16.8
			Own fabric	606.4	5.4	7.2	1,054.8	9.4	12.5
			Integrated	1,639.6	7.1	6.9	2,796.3	12.1	11.8
b. Complex processing	Medium	23.3	Commission	643.2	10.7	11.2	902.8	15.1	15.8
			Own fabric	959.9	4.2	4.4	1,946.2	8.6	9.0
			Integrated	2,856.7	7.5	6.9	4,879.8	12.9	11.7
c. Desizing	Medium	53.6	Commission	2,384.6	11.2	11.8	3,445.4	16.2	17.1
			Own fabric	2,431.3	4.7	4.7	4,863.0	9.3	9.4
			Integrated	5,124.9	7.1	5.5	9,204.2	12.8	9.9
5. Knit fabric finishing									
a. Simple processing	Medium	19.3	Commission	642.7	9.8	8.0	1,034.4	15.8	13.8
			Integrated	2,722.6	6.5	8.6	3,831.4	9.2	12.0
b. Complex processing	Medium	18.5	Commission	591.0	9.5	7.7	1,004.4	16.2	13.0
			Integrated	2,371.6	5.9	6.5	3,711.4	9.2	10.1
c. Hosiery products	Large	12.6	Own hosiery	2,639.2	6.9	13.0	3,151.8	8.2	15.5
			Integrated	2,047.4	7.1	15.0	2,622.0	9.1	19.2
6. Carpet finishing	Medium	48.6	Integrated	1,935.9	5.9	8.4	2,810.7	8.6	12.2
7. Stock & yarn finishing	Medium	9.8	Commission	122.1	6.5	3.0	370.7	19.9	9.2
			Own yarn	482.1	5.7	6.4	790.5	9.4	10.6
8. Nonwoven manufacturing	Large	56.7	N.A.	3,383.4	7.0	5.8	6,263.4	13.0	10.6
9. Felted fabric processing	Medium	4.4	N.A.	321.6	3.5	1.8	1,249.5	13.5	7.0

The baseline income and cash flow characteristics are discussed below for the three categories of model plants.

1. Existing Direct Discharging Models

As shown in Table VI-14, after-tax income ranged from a loss of $64,000 for the small wool scouring model (1) to a profit of over $7 million for the large integrated woven fabric (complex) model (4b). The returns on sales for the small plants in most subcategories were 2 percent or less, with three of the small models having returns of less than 1 percent. The most profitable model was the small felted fabric model (9) with a return on sales of close to 4.8 percent (after-tax). The commission mills were the least profitable, with most of the size models having returns on sales of less than 2 percent.

The existing direct discharging models' cash flow were positive in all cases. The smallest cash flow was the small wool scouring model (1) with a negative cash flow of $22,000. The largest cash flow generated was for the large integrated woven complex (4b), with its annual cash flow nearly $14 million.

2. Existing Indirect Discharging Models

The after-tax incomes for the medium and large models in this category correspond fairly closely to those of the medium and large models in the previous category. As shown in Table VI-15, the incomes ranged from a low of about $11,000 for the small commission woven fabric (simple) model (4a) to a positive income of close to $6 million for the large integrated woven fabric model (desizing) (4c). As a percent of sales, the returns for the small models were slightly lower than those of the existing direct discharging models.

The annual cash flows for the existing indirect discharging models were all positive with a low of $11,000 for the small commission woven simple (4a) to a high of over $11 million for the large integrated woven fabric (desizing) model (4c).

3. New Source Models

The after-tax income for the new source models are shown in Tables VI-16 and VI-17 for direct and indirect dischargers, respectively. The incomes are substantially greater than those of the existing models for two reasons. First, the cost structures used as the basis for developing new source models were those of the more profitable and competitive plants in each of the subcategories, not the typical plants. Secondly, the 15 percent efficiency increases which were assumed to occur, for the most part, offset the high capital recovery costs associated with the new facilities. While the incomes may appear high in comparison to those of the existing models, they are not unrealistic when measured as returns on investment. It is highly unlikely that any firm would undertake the construction and operation of a new plant with a projected before-tax return on investment (ROI) of less than 10 percent. Most of the new source models fall within the 10 to 20 percent range. The largest portion of the after-tax incomes as measured by return on sales fall between 5 and 7 percent in both the direct and indirect categories. The lowest return, 3.5 percent, is earned by the felted fabric processing model (9) (indirect discharger). Four models earn returns in excess of 10 percent, one model in knit fabric finishing (5) (direct discharger) and three in woven fabric finishing (4) (indirect dischargers).

VII. WASTEWATER CONTROL COSTS

This chapter outlines the discharge status of the textile industry, selected alternative treatment technologies, costs associated with these technologies, options considered for proposal, and options recommended for proposal. The supportive data and analyses for the information presented in this chapter are presented in the Development Document. 1/

A. Discharge and Wastewater Treatment Status

1. Current Levels of Wastewater Treatment

As discussed in Chapter VI, about 20 percent of the mills generating process-related wastewater are classified as direct dischargers with their wastewater being discharged directly into receiving water; the remaining 80 percent are indirect dischargers with wastewater being discharged to publicly owned treatment works (POTW's). These estimates were based on a survey conducted by the Technical Contractor which involved close to 2,000 production facilities. The results of this survey are shown in Table VII-1. Hosiery products (5c) had the largest percentage of indirect dischargers with a total of 153 which amounted to 96 percent of the total mills surveyed in this subcategory. The wool scouring subcategory (1) had the least percentage of indirect dischargers with 63 percent of the total number of those mills surveyed being indirect dischargers. Within the other subcategories, the percentage of indirect dischargers varied generally between 70 and 90 percent.

The control measures and treatment technologies that are being utilized in the textile industry include a broad range of in-plant controls and end-of-pipe treatment. The in-plant control measures range from minor water conservation to complete change of process such as the replacement of batch processing with continuous systems and aqueous dyeing with nonaqueous. The treatment technologies employed range from no treatment to complete recycle systems. The technologies, as listed below, include no treatment; preliminary treatment (neutralization, screening, equalization, heat exchange, disinfection, primary sedimentation, and flotation);

1/ Development Document for Proposed Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Textile Mills Point Source Category, U.S. Environmental Protection Agency, Effluent Guidelines Division, EPA 440/1/79-022b.

Table VII-1. The textile industry-discharge status (before baseline closures)

Subcategory	Direct Dischargers: Number of plants	Direct Dischargers: Percent of total in subcategory	Indirect Dischargers: Number of plants	Indirect Dischargers: Percent of total in subcategory	Total
1. Wool scouring	6	38	10	63	16
2. Wool finishing	8	24	26	76	34
3. Low water use processing					
a. General	66	23	223	77	289
b. Water jet weaving	3	43	4	57	7
4. Woven fabric finishing					
a. Simple processing	35	18	156	82	191
b. Complex processing	14	20	56	80	70
c. Desizing	36	54	31	46	67
5. Knit fabric finishing					
a. Simple processing	24	11	185	89	209
b. Complex processing	15	24	47	76	62
c. Hosiery products	7	4	153	96	160
6. Carpet finishing	11	20	45	80	56
7. Stock & yarn finishing	36	17	178	83	214
8. Nonwoven manufacturing	5	16	26	84	31
9. Felted fabric processing	1	6	15	94	16
TOTAL	267	19	1,155	81	1,422

Source: Effluent Guideline Division, U.S. Environmental Protection Agency, Development Document.

biological or BPT equivalent treatment (aerated and unaerated lagoons, biological filtration, activated sludge, and chemical coagulation/sedimentation without preceding biological treatment); and advanced treatment (filtration, chemical coagulation, and/or granular or powdered carbon). As shown below, approximate 7 percent of the direct dischargers are operating with advanced treatment technologies while about 56 percent are operating with BPT equivalent systems. Thirty seven percent provide no treatment or preliminary treatment only. However, it is expected that many of these are awaiting to connect to POTW's currently under construction or in the design stage.

Wastewater Treatment Status

	Direct Dischargers	Indirect Dischargers
	(Percent)	(Percent)
No treatment	18	58
Preliminary	19	35
Biological (BPT)	56	7
Advanced	7	1
	100	100

Approximately 60 percent of the indirect dischargers provide no treatment while over 30 percent provide preliminary treatment. Seven percent of the indirect dischargers operate with biological or BPT equivalent treatment systems.

2. Plants Requiring Expenditures

Table VII-2 shows the total number of direct and indirect dischargers in each subcategory and the number requiring BAT and PSES expenditures before baseline closures. In the direct discharge category, over 60 percent of the plants will be required to make BAT expenditures. The remaining are currently meeting the required effluent limitations. In most cases the direct dischargers have met BPT requirements. Only 12 percent of the indirect dischargers are expected to require expenditures for PSES. Although over half of the indirect dischargers are providing no treatment, they can generally comply with PSES limitations with appropriate in-plant controls. Those mills required to make expenditures are those discharging heavy metals in their waste streams.

The number of plants requiring expenditures is shown by subcategory and size on page VIII-27 for direct dischargers and on page VIII-66 for indirect dischargers.

B. Alternative Treatment Technologies

As discussed in the Development Document, a broad range of alternative treatment technologies were selected for the development of costs and for

Table VII-2. The textile industry-plants requiring pollution control expenditures (BAT and PSES) (before baseline closures)

	Direct Dischargers		Indirect Dischargers	
Subcategory	Total number of plants	Plants requiring expenditure (BAT)	Total number of plants	Plants requiring expenditure (PSES)
1. Wool scouring	6	5	10	7
2. Wool finishing	8	8	26	18
3. Low water use processing				
a. General 1/	66	0	223	0
b. Water jet weaving 1/	3	3	4	0
4. Woven fabric finishing				
a. Simple processing	35	23	156	0
b. Complex processing	14	14	56	19
c. Desizing	36	29	31	16
5. Knit fabric finishing				
a. Simple processing	24	22	185	0
b. Complex processing	15	12	47	0
c. Hosiery products	7	7	153	51
6. Carpet finishing	11	6	45	0
7. Stock & yarn finishing	36	32	178	30
8. Nonwoven manufacturing	5	5	26	0
9. Felted fabric finishing	1	1	15	0
INDUSTRY TOTAL	267	167	1,155	141

1/ Low water use processing plants are required to meet BCT effluent limitations, only.

Note: See Page VIII-27 for a detailed listing by size category and after baseline closures for direct dischargers and Page VIII-66 for indirect dischargers.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

the analysis of these costs and resulting benefits in terms of pollutant reductions. The technologies selected for analysis are described in Table VII-3 for existing sources and Table VII-4 for new sources. Some treatment alternatives were based on individual technologies and others on combinations of two or more components. The technologies include chemical coagulation, filtration, flotation, activated carbon adsorption, and ozonation.

The applicability of the various technologies for each of the subcategories of existing source direct dischargers is illustrated in Table VII-5. For these models, it was assumed that the BPT level of treatment was in place (except as noted previously for the base case) which includes screening, extended-aeration, activated sludge, and secondary sedimentation with solids recycled to the aeration basin.

The applicability of the various technologies for the existing indirect sources are shown in Table VII-6. The alternatives for each of the levels of control included screening and equalization along with one or a combination of the following technologies: chemical coagulation, multi-media filtration, dissolved air flotation, activated carbon adsorption, and ozonation. It was assumed that under baseline the models were not providing any treatment.

Alternative treatment technologies for the new source direct dischargers were described in Table VII-4 and their application to the model plants is shown in Table VII-7.

Alternative treatment technologies for new source indirect dischargers are also described in Table VII-7. These alternatives modify those of the new source direct dischargers by eliminating the activated sludge process and providing segregation of toxic pollutants.

C. Wastewater Treatment Costs

The costs of the alternative treatment technologies developed for the model plants were based on the models' production levels, estimated wastewater flows, and wastewater characteristics as discussed in the Development Document.

1. Investment Costs

Investment costs included installed costs of treatment components and monitoring equipment plus allowances for contingencies and engineering. A contingency allowance of 15 percent of the installed cost was used to cover unexpected costs due to local mill conditions. No allowance was made for the possibility of temporary mill shutdowns during construction. Engineering costs were estimated by using a percentage of installed costs plus contingencies.

Table VII-3. The textile industry, alternative treatment technologies existing sources (direct and indirect dischargers)

Technology	Description
A* Direct	BPT - Screening, extended aeration activated sludge, sedimentation, and solids recycle to aeration basin
Indirect	No treatment
B	Chemical coagulation and sedimentation
C	Multi-media filtration
D	Chemical coagulation, sedimentation, and multi-media filtration
E	Multi-media filtration and granular activated carbon
F	Chemical coagulation, sedimentation, multi-media filtration and granular activated carbon
G	Ozonation
H	Chemical coagulation, sedimentation, and ozonation
I	Powdered activated carbon treatment
J	Multi-media filtration and ozonation
K	Chemical coagulation, sedimentation, multi-media filtration, and ozonation
M**	Chemical coagulation and dissolved air flotation
N**	Chemical coagulation, dissolved air flotation, multi-media filtration, and granular activated carbon
P**	Chemical coagulation, dissolved air flotation, and ozonation

* Alternative A is considered in place. All other alternatives are added on to A and for indirect dischargers include screening and equalization.

** Alternatives M, N, and P apply to wool scouring only.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-4. The textile industry, alternative treatment technologies new sources (NSPS and PSNS)

Type discharge	Technology	Description
Direct (NSPS)	A	Biological treatment (extended aeration activated sludge).
	Q	Powdered activated carbon treatment.
	R	Biological treatment plus chemical coagulation and multimedia filtration.
	S	Segregation of toxic pollutants waste streams from other streams. Provide multimedia filtration and carbon adsorption for toxic pollutant waste streams and biological treatment for other waste streams.
	T	Segregation of toxic pollutants waste streams from other waste streams. Provide chemical coagulation, multimedia filtration, and carbon absorption for toxic pollutant waste streams and biological treatment for other waste streams.
	U	Segregation of toxic pollutants waste stream from other waste streams. Provide multimedia filtration for toxic pollutant waste streams and biological treatment for other waste streams.
Indirect (PSNS)	A	Preliminary treatment (screening, equalization, and/or neutralization).
	O	Segregation of toxic pollutant waste streams from other waste streams. Preliminary treatment plus chemical coagulation of toxic pollutant waste streams and screening for other waste streams.
	R	Segregation of toxic pollutant waste streams from other waste streams. Preliminary treatment plus chemical coagulation and multimedia filtration for toxic pollutant waste streams and screening for other waste streams.
	S	Segregation of toxic pollutant waste streams from other waste streams. Preliminary treatment plus multimedia filtration and carbon adsorption for toxic pollutant waste streams and screening for other waste streams.
	T	Segregation of toxic pollutant waste streams from other waste streams. Preliminary treatment plus chemical coagulation and multimedia filtration and carbon adsorption for toxic pollutant waste streams and screening for other waste streams.

Source: Effluent Guidelines Division. U.S. Environmental Protection Agency, Development Document.

Table VII-5. The textile industry, model plant wastewater control technologies considered for existing direct dischargers

Subcategory	Alternative Treatment Technologies (BAT)													
	A	B	C	D	E	F	G	H	I	J	K	M	N	P
1. Wool scouring			X	X								X	X	X
2. Wool finishing		X		X		X	X	X	X		X			
3. (Omitted)														
4. Woven fabric finishing														
a. Simple processing		X	X	X	X	X	X	X	X	X	X			
b. Complex processing		X	X	X	X	X	X	X	X	X	X			
c. Desizing		X	X	X	X	X	X	X	X	X	X			
5. Knit fabric finishing														
a. Simple processing		X	X	X	X	X	X	X	X	X	X			
b. Complex processing		X	X	X	X	X	X	X	X	X	X			
c. Hosiery products	X	X	X	X		X	X	X	X		X			
6. Carpet finishing		X	X	X	X	X	X	X	X	X	X			
7. Stock & yarn finishing		X	X	X	X	X	X	X	X	X	X			
8. Nonwoven manufacturing	X	X	X	X	X	X	X	X	X	X	X			
9. Felted fabric processing	X	X		X		X	X	X	X		X			

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-6. The textile industry, model plant wastewater control technologies considered for existing indirect dischargers

Subcategory	Alternative Treatment Technologies (PSES)							
	B	D	F	H	J	M	N	P
1. Wool scouring	X					X	X	X
2. Wool finishing	X	X	X	X	X			
3. (omitted)								
4. Woven fabric finishing								
a. Simple processing	X	X	X	X	X			
b. Complex processing	X	X	X	X				
c. Desizing	X	X	X	X				
5. Knit fabric finishing								
a. Simple processing	X	X	X	X	X			
b. Complex processing	X	X	X	X	X			
c. Hosiery products	X	X	X	X	X			
6. Carpet finishing	X	X	X	X	X			
7. Stock & yarn finishing	X	X	X	X	X			
8. Nonwoven manufacturing	X	X	X	X	X			
9. Felted fabric processing	X	X	X	X				

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-7. The textile industry, model plant wastewater control technology for new sources

Subcategory	Direct Dischargers (NSPS)						Indirect Dischargers (PSNS)				
	A	Q	R	S	T	U	A	O	R	S	T
1. (Omitted)											
2. Wool finishing	X	X	X	X	X	X	X	X	X	X	X
3. (Omitted)											
4. Woven fabric finishing											
a. Simple processing	X	X	X	X	X	X	X	X	X	X	X
b. Complex processing	X	X	X	X	X	X	X	X	X	X	X
c. Desizing	X	X	X	X	X	X	X	X	X	X	X
5. Knit fabric finishing											
a. Simple processing	X	X	X	X	X	X	X	X	X	X	X
b. Complex processing	X	X	X	X	X	X	X	X	X	X	X
c. Hosiery products	X	X	X	NA	X	X	X	X	X	X	X
6. Carpet finishing	X	X	X	X	X	X	X	X	X	X	X
7. Stock & yarn finishing	X	X	X	X	X	X	X	X	X	X	X
8. Nonwoven manufacturing	X	X	X	X	X	X	X	X	X	X	X
9. Felted fabric processing	X	X	X	X	X	X	X	X	X	X	X

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

The installed costs included costs for both equipment and construction. The break-out of the percentages for each of these components for the major processes is shown below.

Process	Equipment	Construction
Chemical coagulation	20%	80%
Filtration	20	80
Dissolved air flotation	35	65
Activated carbon	50	50
Ozonation	50	50
Vacuum filtration	35	65

The same bases were used in developing the costs for models in all categories. It should be noted that according to the Development Document all technologies have small space requirements and accordingly, no land costs were included.

The investment costs for the existing sources are contained in Tables VII-8 and VII-9 for direct and indirect dischargers, respectively. Costs for new source models are shown in Tables VII-10 and VII-11. Investment costs of the alternatives are also shown and expressed as percent of fixed assets in Tables VII-12, VII-13, VII-14 and VII-15. Since these controls are considered a part of the mills assets, this method of expressing the requirements illustrates the relative magnitude of the treatment costs.

2. Total Yearly Costs

Total yearly wastewater treatment costs consist of annual operating and maintenance expenditures, cost of capital, and depreciation. Operating and maintenance expenditures are shown for the existing models in Tables VII-16 and VII-17 for the direct and indirect dischargers, respectively; those for the new source models are included in Tables VII-18 and VII-19. The operating and maintenance expenditures include labor (rates of $15-$20 per hour were used as the total cost for wages, benefits, and payroll processing expense), sludge disposal (ranging from 2 to 25 dollars per ton), energy and power, chemicals, and monitoring.

Capital cost was assumed to be 10-15 percent of the total investment. Depreciation was calculated on a straight-line basis for the assumed life of each alternative which was generally 15 years.

The total yearly costs are shown in Tables VII-20, VII-21, VII-22, and VII-23 and represent the maximum costs, in 1979 dollars, that would occur during the life of the pollution control facilities. It was assumed in the subsequent analysis, that the required outlays would be made over a period of time, usually between 3 to 6 years. Consequently, the yearly costs were

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Table VII-8 . The textile industry, existing model plant wastewater controls' investment requirements - direct dischargers

Subcategory	Size	Daily capacity	Treatment alternatives (BAT) -- existing sources													
			A	B	C	D	E	F	G	H	I	J	K	M1/	N1/	P1/
		(kkg)	($1,000)													
1. Wool scouring	Small	16.2	NA	NA	93.0	231.0	NA	NA	NA	NA	NA	NA	NA	236.0	362.0	312.0
	Medium	35.6	NA	NA	133.0	303.0	NA	NA	NA	NA	NA	NA	NA	293.0	496.0	432.0
	Large	81.0	NA	NA	200.0	452.0	NA	NA	NA	NA	NA	NA	NA	410.0	1,549.0	671.0
2. Wool finishing	Small	7.4	NA	365.0	NA	611.0	NA	1,715.0	523.0	856.0	326.0	NA	1,098.0			
	Medium	18.6	NA	536.0	NA	959.0	NA	2,722.0	1,044.0	1,551.0	466.0	NA	1,969.0			
	Large	37.3	NA	778.0	NA	1,449.0	NA	4,042.0	1,743.0	2,486.0	2,512.0	NA	3,146.0			
3. (Omitted)																
4. Woven fabric finishing																
a. Simple processing	Small	5.4	NA	206.0	133.0	303.0	241.0	410.0	168.0	345.0	239.0	273.0	442.0			
	Medium	29.6	NA	365.0	297.0	611.0	1,409.0	1,715.0	523.0	856.0	326.0	788.0	1,098.0			
	Large	73.9	NA	528.0	488.0	950.0	2,249.0	2,714.0	1,044.0	1,542.0	466.0	1,503.0	1,961.0			
b. Complex processing	Small	23.3	NA	365.0	297.0	611.0	1,409.0	1,715.0	523.0	856.0	326.0	788.0	1,098.0			
	Medium	116.3	NA	763.0	747.0	1,434.0	3,343.0	4,027.0	1,743.0	2,475.0	2,512.0	2,458.0	3,146.0			
	Large	193.8	NA	1,112.0	1,018.0	2,039.0	4,934.0	5,955.0	2,561.0	3,626.0	2,796.0	3,533.0	4,555.0			
c. Desizing	Small	21.4	NA	365.0	297.0	611.0	1,409.0	1,715.0	523.0	856.0	326.0	788.0	1,098.0			
	Medium	53.6	NA	528.0	488.0	950.0	2,249.0	2,714.0	1,044.0	1,542.0	466.0	1,503.0	1,961.0			
	Large	178.5	NA	1,112.0	1,018.0	2,039.0	4,934.0	5,955.0	2,561.0	3,626.0	2,796.0	3,533.0	4,555.0			
5. Knit fabric finishing																
a. Simple processing	Small	8.0	NA	263.0	200.0	420.0	1,181.0	1,401.0	293.0	524.0	261.0	464.0	681.0			
	Medium	32.2	NA	447.0	387.0	773.0	1,738.0	2,124.0	785.0	1,197.0	392.0	1,138.0	1,526.0			
	Large	160.8	NA	1,112.0	1,018.0	2,039.0	4,934.0	5,955.0	2,561.0	3,626.0	3,796.0	3,533.0	4,555.0			
b. Complex processing	Small	7.7	NA	263.0	200.0	420.0	1,181.0	1,401.0	293.0	524.0	261.0	464.0	681.0			
	Medium	18.5	NA	365.0	297.0	611.0	1,409.0	1,715.0	523.0	856.0	326.0	788.0	1,098.0			
	Large	30.9	NA	447.0	387.0	773.0	1,738.0	2,124.0	785.0	1,197.0	392.0	1,138.0	1,526.0			
c. Hosiery products	Small	2.5	239.0	172.0	93.0	231.0	NA	297.0	105.0	247.0	230.0	NA	307.0			
	Medium	5.5	308.0	206.0	133.0	303.0	NA	410.0	168.0	345.0	239.0	NA	442.0			
6. Carpet finishing	Small	20.2	NA	263.0	200.0	420.0	1,181.0	1,401.0	293.0	524.0	261.0	464.0	681.0			
	Medium	48.6	NA	365.0	297.0	611.0	1,409.0	1,715.0	523.0	856.0	326.0	788.0	1,098.0			
	Large	121.5	NA	528.0	488.0	950.0	2,249.0	2,714.0	1,044.0	1,542.0	466.0	1,503.0	1,961.0			
7. Stock & yarn finishing	Small	9.8	NA	263.0	200.0	420.0	1,181.0	1,401.0	293.0	524.0	261.0	464.0	681.0			
	Medium	23.5	NA	365.0	297.0	611.0	1,409.0	1,715.0	523.0	856.0	326.0	788.0	1,098.0			
	Large	39.1	NA	447.0	387.0	773.0	1,738.0	2,124.0	785.0	1,197.0	392.0	1,138.0	1,526.0			
	X-Large	58.6	NA	528.0	488.0	950.0	2,249.0	2,714.0	1,014.0	1,542.0	466.0	1,503.0	1,961.0			
8. Nonwoven manufacturing	Small	10.4	308.0	206.0	133.0	303.0	241.0	410.0	168.0	345.0	239.0	273.0	442.0			
	Medium	23.6	404.0	263.0	200.0	420.0	1,181.0	1,401.0	293.0	524.0	261.0	464.0	681.0			
9. Felted fabric processing	Small	0.9	239.0	172.0	NA	231.0	NA	297.0	105.0	247.0	230.0	NA	307.0			
	Medium	2.0	308.0	206.0	NA	303.0	NA	410.0	168.0	345.0	239.0	NA	442.0			

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-9. The textile industry, existing model plant wastewater controls' investment requirements-indirect dischargers

Subcategory	Size	Daily Capacity	Treatment alternatives (PSES) --existing sources							
			B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)	($1,000)							
1. Wool scouring	Small	16.2	256.0	NA	NA	NA	NA	320.0	445.0	395.0
	Large	81.0	459.0	NA	NA	NA	NA	575.0	1,706.0	837.0
2. Wool finishing	Small	3.1	366.0	522.0	1,504.0	628.0	650.0			
	Medium	18.6	745.0	1,169.0	2,931.0	1,753.0	1,800.0			
	Large	37.3	1,049	1,715.0	4,314.0	2,763.0	1,833.0			
3. (Omitted)										
4. Woven fabric finishing										
a. Simple processing	Small	2.4	251.0	310.0	377.0	327.0	337.0			
	Medium	12.3	366.0	522.0	1,504.0	628.0	650.0			
	Large	49.3	607.0	931.0	2,285.0	1,358.0	1.386.0			
b. Complex processing	Small	9.7	366.0	522.0	1,504.0	628.0	NA			
	Medium	23.3	493.0	739.0	1,866.0	982.0	NA			
	Large	116.3	1,080.0	1,746.0	4,310.0	2,794.0	NA			
c. Desizing	Small	21.4	493.0	739.0	1,866.0	982.0	NA			
	Medium	53.6	765.0	1,189.0	2,951.0	1,773.0	NA			
	Large	178.5	1,508.0	2,434.0	6,348.0	4,019.0	NA			
5. Knit fabric finishing										
a. Simple processing	Small	1.6	251.0	310.0	377.0	327.0	337.0			
	Medium	19.3	493.0	739.0	1,866.0	982.0	1,002.0			
	Large	32.2	607.0	931.0	2,285.0	1,358.0	1,386.0			
b. Complex processing	Small	7.7	366.0	522.0	1,504.0	628.0	650.0			
	Medium	18.5	493.0	739.0	1,866.0	982.0	1,002.0			
	Large	46.3	753.0	1,177.0	2,939.0	1,761.0	1,800.0			
c. Hosiery products	Small	2.5	251.0	310.0	377.0	327.0	337.0			
	Medium	5.5	293.0	390.0	496.0	432.0	447.0			
	Large	12.6	366.0	522.0	1,504.0	628.0	650.0			
6. Carpet finishing	Small	8.9	293.0	390.0	496.0	432.0	447.0			
	Medium	48.6	493.0	739.0	1,866.0	982.0	1,002.0			
	Large	121.5	753.0	1,177.0	2,939.0	1,761.0	1,800.0			
7. Stock & yarn finishing	Small	4.3	293.0	390.0	496.0	432.0	447.0			
	Medium	9.8	366.0	522.0	1,504.0	628.0	650.0			
	Large	23.5	493.0	739.0	1,866.0	982.0	1,002.0			
	X-Large	58.6	745.0	1,169.0	2,931.0	1,753.0	1,800.0			
8. Nonwoven manufacturing	Small	10.4	293.0	390.0	496.0	432.0	447.0			
	Medium	23.6	366.0	522.0	1,504.0	628.0	650.0			
	Large	56.7	493.0	739.0	1,866.0	982.0	1,002.0			
9. Felted fabric processing	Small	0.9	251.0	310.0	377.0	327.0	NA			
	Medium	4.4	366.0	522.0	1,504.0	628.0	NA			
	Large	10.7	493.0	739.0	1,866.0	982.0	NA			

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-10. The textile industry, new source model plant wastewater controls' investment requirements-indirect dischargers

Subcategory	Size	Daily capacity	Treatment Alternative (PSNS)1/-new source O	R	S	T
	(kkg)		- - - - - - - -($1,000)- - - - - - - - -			
1. (Omitted)						
2. Wool finishing	Medium	18.6	661.0	987.0	2,041.0	2,340.1
3. (Omitted)						
4. Woven fabric finishing						
a. Simple processing	Medium	12.3	359.0	474.0	1,288.0	1,388.0
b. Complex processing	Medium	23.3	469.0	666.0	1,539.0	1,707.0
c. Desizing	Medium	53.6	667.0	993.0	2,041.0	2,347.0
5. Knit fabric finishing						
a. Simple processing	Medium	19.3	469.0	666.0	1,539.0	1,707.0
b. Complex processing	Medium	18.5	469.0	666.0	1,539.0	1,707.0
c. Hosiery products	Large	12.6	359.0	474.0	1,288.0	1,388.0
6. Carpet finishing	Medium	48.6	469.0	666.0	1,539.0	1,707.0
7. Stock & Yarn finishing	Medium	9.8	359.0	474.0	1,288.0	1,388.0
8. Nonwoven manufacturing	Large	56.7	469.0	666.0	1,539.0	1,707.0
9. Felted fabric processing	Medium	4.4	359.0	474.0	1,288.0	1,388.0

1/ Costs for Treatment Alternative A are omitted.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-11. The textile industry, new source model plant wastewater controls' investment requirements - direct dischargers

Subcategory	Size	Daily capacity	Treatment alternative (NSPS) - new sources					
			A	Q	R	S	T	U
		(kkg)	($1,000)					
1. (Omitted)								
2. Wool finishing	Medium	18.6	2,275.0	2,316.0	3,204.0	2,142.0	2,529.0	2,701.0
3. (Omitted)								
4. Woven fabric finishing								
a. Simple processing	Medium	29.6	573.0	1,661.0	1,061.0	1,562.0	1,817.0	818.0
b. Complex processing	Medium	116.3	3,624.0	5,237.0	5,020.0	3,123.0	3,639.0	4,292.0
c. Desizing	Medium	53.6	2,275.0	2,316.0	3,196.0	2,142.0	2,535.0	2,701.0
5. Knit fabric finishing								
a. Simple processing	Medium	32.2	1,744.0	1,923.0	2,484.0	1,748.0	2,061.0	2,071.0
b. Complex processing	Medium	18.5	573.0	1,661.0	1,061.0	1,562.0	1,817.0	818.0
c. Hosiery products	Medium	5.5	310.0	1,423.0	493.0	NA	601.0	407.0
6. Carpet finishing	Small	20.2	405.0	1,439.0	705.0	1,468.0	1,680.0	563.0
7. Stock & yarn finishing	Medium	23.4	573.0	1,661.0	1,061.0	1,562.0	1,817.0	818.0
8. Nonwoven manufacturing	Medium	23.6	405.0	1,439.0	705.0	1,468.0	1,680.0	563.0
9. Felted fabric processing	Medium	4.4	405.0	1,439.0	705.0	1,468.0	1,680.0	563.0

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-12. The textile industry, model plant wastewater controls' investment requirements expressed as a percentage of fixed assets - direct dischargers.

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (BAT) -- existing sources										
				A	B	C	D	E	F	G	H	I	J	K
		(kkg)		(percent)										
									(M	N	P) 1/			
1. Wool scouring	Small	16.2	Commission	NA	NA	37.5	93.1	NA	95.1	145.8	125.8	NA	NA	NA
	Medium	35.6	Commission	NA	NA	7.1	16.2	NA	15.6	26.4	23.0	NA	NA	NA
	Large	81.0	Commission	NA	NA	4.4	9.9	NA	9.0	34.0	14.8	NA	NA	NA
2. Wool finishing	Small	7.4	Integrated	NA	18.4	NA	30.8	NA	86.6	26.4	43.2	16.4	NA	55.4
	Medium	18.6	Integrated	NA	19.9	NA	35.6	NA	101.0	38.8	57.6	17.3	NA	73.1
	Large	37.3	Integrated	NA	7.8	NA	14.5	NA	40.5	17.5	24.9	25.2	NA	31.5
3. (omitted)														
4. Woven fabric finishing														
a. Simple processing	Small	5.4	Commission	NA	72.6	46.8	106.8	84.9	144.4	59.2	121.5	84.2	96.2	155.7
			Own fabric	NA	41.3	26.7	60.8	48.3	82.3	33.8	69.3	48.0	54.8	88.8
			Integrated	NA	15.3	9.9	22.6	18.0	30.6	12.5	25.8	17.8	20.3	33.0
	Medium	29.6	Commission	NA	15.1	12.3	25.3	58.3	71.0	21.7	35.4	13.5	32.6	45.4
			Own fabric	NA	12.6	10.3	21.1	48.6	59.1	18.0	29.5	11.3	27.2	37.8
			Integrated	NA	3.2	2.6	5.3	12.3	14.8	4.5	7.4	2.8	6.8	9.5
	Large	73.9	Commission	NA	8.8	8.1	15.7	37.1	44.8	17.3	25.4	7.7	24.8	32.3
			Integrated	NA	4.1	3.8	7.3	17.4	21.0	8.1	11.9	3.6	11.6	15.2
b. Complex processing	Small	23.3	Commission	NA	17.9	14.6	30.0	69.1	84.1	25.7	42.0	16.0	38.7	53.8
			Integrated	NA	7.4	6.0	12.4	28.6	34.8	10.6	17.3	6.6	16.0	22.3
	Medium	116.3	Commission	NA	6.6	6.4	12.4	28.9	34.8	15.1	21.4	21.7	21.3	27.2
			Own fabric	NA	5.2	5.1	9.8	22.8	27.3	11.8	16.8	17.1	16.7	21.4
			Integrated	NA	4.2	4.0	7.8	18.1	21.8	9.4	13.4	13.6	13.3	17.0
	Large	193.8	Integrated	NA	2.9	2.7	5.4	13.1	15.8	6.8	9.6	7.4	9.3	12.1
c. Desizing	Small	21.4	Commission	NA	24.0	19.5	40.2	92.7	112.8	34.4	56.3	21.4	51.8	72.2
			Own fabric	NA	13.4	10.9	22.5	51.9	63.2	19.3	31.5	12.0	29.0	40.4
			Integrated	NA	3.8	3.1	6.3	14.5	17.6	5.3	8.8	3.3	8.1	11.3
	Medium	53.6	Commission	NA	9.9	9.2	17.9	42.4	51.2	19.7	29.1	8.8	28.3	37.0
			Own fabric	NA	6.2	5.7	11.1	26.2	31.6	12.2	17.9	5.4	17.5	22.8
			Integrated	NA	5.7	5.3	10.2	24.0	29.0	11.2	16.5	5.0	16.1	20.9
	Large	178.5	Own fabric	NA	3.8	3.4	6.8	16.6	20.0	8.6	12.2	9.4	11.8	15.3
			Integrated	NA	6.1	5.6	11.1	26.8	32.4	13.9	19.8	15.3	19.3	24.8

(continued) . . .

Table VII-12 (continued)

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (BAT) -- existing sources A	B	C	D	E	F	G	H	I	J	K
		(kkg)		(percent)										
5. Knit fabric finishing a. Simple processing	Small	8.0	Commission	NA	44.3	33.7	70.7	198.7	235.8	49.3	88.2	43.9	71.1	114.6
			Integrated	NA	17.4	13.3	27.8	78.3	92.8	19.4	34.8	17.3	30.8	45.2
	Medium	32.2	Commission	NA	18.3	15.8	31.7	71.2	87.0	32.2	49.0	16.1	46.6	62.5
			Integrated	NA	6.5	5.6	11.3	25.3	30.8	11.4	17.3	5.7	16.5	22.2
	Large	160.8	Commission	NA	8.6	7.8	15.7	37.9	45.8	19.7	27.8	21.5	27.2	35.0
			Integrated	NA	3.4	3.1	6.3	15.2	18.3	7.8	11.2	8.6	10.8	14.0
b. Complex processing	Small	7.7	Commission	NA	45.7	34.7	72.8	204.9	243.1	50.8	90.9	45.3	80.5	118.2
			Integrated	NA	12.3	9.3	19.7	55.2	65.5	13.7	24.5	12.2	21.7	31.8
	Medium	18.5	Integrated	NA	7.0	5.7	11.7	27.0	32.8	10.0	16.4	6.3	15.1	21.0
	Large	30.9	Commission	NA	17.9	15.5	30.9	69.6	85.1	31.4	47.9	15.7	45.6	61.1
			Integrated	NA	2.1	1.8	3.7	8.2	10.0	3.7	5.7	1.8	5.3	7.2
c. Hosiery products	Small	2.5	Own hosiery	205.3	147.8	79.9	198.4	NA	255.2	90.2	212.2	197.6	NA	263.8
			Integrated	8.6	6.2	3.3	8.3	NA	10.7	3.8	8.8	8.3	NA	11.0
	Medium	5.5	Own hosiery	16.7	11.2	7.2	16.4	NA	22.3	9.1	18.7	12.9	NA	23.9
6. Carpet finishing	Small	20.2	Integrated	NA	10.1	7.7	16.1	45.2	53.6	10.9	20.0	10.0	17.8	26.1
	Medium	48.6	Integrated	NA	15.2	12.3	25.4	58.7	71.4	21.8	35.7	13.6	32.8	45.8
	Large	121.5	Integrated	NA	5.0	4.6	9.0	21.3	25.7	9.8	14.6	4.4	14.2	18.5
7. Stock & yarn finishing	Small	9.8	Commission	NA	59.0	44.8	94.3	264.9	314.3	65.8	117.5	58.6	104.1	152.8
			Own yarn	NA	20.3	15.5	32.5	91.4	108.4	22.7	40.6	20.2	35.9	52.7
			Integrated	NA	72.2	54.9	115.3	324.2	384.6	80.4	143.8	71.7	127.3	186.9
	Medium	23.5	Own yarn	NA	11.1	9.0	18.6	42.8	52.2	15.9	26.0	9.9	24.0	33.4
			Integrated	NA	11.4	9.3	19.2	44.2	53.8	16.4	26.8	10.3	24.8	34.4
	Large	39.1	Own yarn	NA	8.7	7.0	14.0	31.5	38.5	14.3	21.7	7.1	20.6	27.7
			Integrated	NA	5.4	4.3	8.8	19.6	24.0	8.8	13.5	4.4	12.8	17.3
	X-Large	58.6	Integrated	NA	4.0	3.7	7.2	17.0	20.5	7.9	11.7	3.5	11.3	14.8
8. Nonwoven manufacturing	Small	10.4	NA	20.4	13.7	8.8	20.1	15.9	27.2	11.1	22.8	15.8	18.1	29.3
	Medium	23.6	NA	12.2	7.9	6.0	12.7	35.5	42.1	8.8	15.8	7.8	13.9	20.5
9. Felted fabric finishing	Small	0.9	NA	20.7	14.9	NA	20.0	NA	25.8	9.1	21.4	19.9	NA	26.6
	Medium	2.0	NA	20.1	13.4	NA	19.8	NA	26.8	10.9	22.5	15.6	NA	28.8

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.
Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-13. The textile industry, model plant wastewater controls' investment requirements expressed as a percentage of the model plants fixed assets - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment Alternative (PSES) - Existing Sources							
				B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)	(percent)								
1. Wool scouring	Small	16.2	Commission	171.5	NA	NA	NA	NA	214.3	298.1	264.6
	Large	81.0	Commission	9.6	NA	NA	NA	NA	12.0	35.5	17.4
2. Wool finishing	Small	3.1	Integrated	40.0	57.0	164.3	68.6	85.2			
	Medium	18.6	Integrated	14.8	23.3	58.4	34.9	43.1			
	Large	37.3	Integrated	10.5	17.2	43.3	27.7	34.1			
3. (omitted)											
4. Woven fabric finishing											
a. Simple processing	Small	2.4	Commission	156.3	192.9	234.7	203.5	251.7			
			Own fabric	40.3	118.0	143.5	124.5	154.0			
			Integrated	47.4	58.5	71.2	61.8	76.3			
	Medium	12.3	Commission	40.3	57.3	165.3	69.0	85.7			
			Own fabric	32.7	46.6	134.2	56.0	69.6			
			Integrated	14.4	20.5	59.1	24.7	30.7			
	Large	49.3	Commission	14.8	22.7	55.6	33.0	40.4			
			Own fabric	12.7	19.4	47.7	28.3	34.7			
			Integrated	4.2	6.4	15.7	9.3	11.4			
b. Complex processing	Small	9.7	Commission	80.3	114.4	329.8	137.7	NA			
			Own fabric	35.7	50.8	146.5	61.2	NA			
			Integrated	19.8	28.3	81.7	34.1	NA			
	Medium	23.3	Commissioned	29.9	44.8	113.3	59.6	NA			
			Own fabric	27.1	40.6	102.5	53.9	NA			
			Integrated	16.3	24.3	61.5	32.3	NA			
	Large	116.3	Commissioned	8.0	12.9	31.8	20.7	NA			
			Own fabric	11.5	18.5	45.8	29.7	NA			
			Integrated	5.8	9.3	22.8	14.8	NA			
c. Desizing	Small	21.4	Commission	35.0	52.5	132.6	69.8	NA			
			Own fabric	25.1	37.7	95.1	50.0	NA			
			Integrated	18.8	28.3	71.3	37.5	NA			
	Medium	53.6	Commission	14.4	22.4	55.7	33.4	NA			
			Own fabric	9.2	14.3	35.4	21.3	NA			
			Integrated	8.2	12.7	31.5	18.9	NA			
	Large	178.5	Own fabric	5.3	8.4	22.0	13.9	NA			
			Integrated	4.0	6.5	16.9	10.8	NA			

(continued) . . .

Table VII-13 (continued)

Subcategory	Size	Daily capacity	Type plant	Treatment Alternative (PSES) - Existing Sources B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)	(percent)								
5. Knit fabric finishing											
a. Simple processing	Small	1.6	Commission	131.1	161.8	196.8	170.8	176.0			
			Integrated	102.5	126.6	153.9	133.5	137.6			
	Medium	19.3	Commission	33.6	50.3	127.1	66.8	68.3			
			Integrated	8.8	13.2	33.3	17.5	17.8			
	Large	32.2	Commission	24.8	38.2	93.6	55.6	56.8			
			Integrated	9.8	15.0	36.8	21.8	22.3			
b. Complex processing	Small	7.7	Commission	41.8	59.6	171.8	71.8	74.3			
			Integrated	19.3	27.4	79.1	33.0	34.2			
	Medium	18.5	Commission	35.3	53.0	133.8	70.4	71.8			
			Integrated	9.4	14.2	35.8	18.8	19.2			
	Large	46.3	Commission	20.1	31.4	78.5	47.0	48.1			
			Integrated	2.3	3.7	9.3	5.5	5.7			
c. Hosiery products	Small	2.5	Own hosiery	74.4	91.9	111.8	97.0	99.9			
			Integrated	23.8	29.3	35.7	30.9	31.8			
	Medium	5.5	Own hosiery	14.7	19.5	24.8	21.6	22.3			
			Integrated	21.7	28.8	36.6	31.9	33.0			
	Large	12.6	Own hosiery	5.6	8.0	23.0	9.6	9.9			
			Integrated	11.1	15.8	45.5	19.0	19.7			
6. Carpet finishing	Small	8.9	Integrated	25.9	34.5	43.8	38.2	39.5			
	Medium	48.6	Integrated	17.7	26.5	66.9	35.3	35.9			
	Large	121.6	Integrated	8.8	13.8	34.6	20.8	21.1			
7. Stock & yarn finishing	Small	4.3	Commission	203.7	271.1	344.8	300.3	310.7			
			Own yarn	113.0	150.4	191.3	166.6	172.3			
			Integrated	183.3	246.3	313.2	272.8	282.2			
	Medium	9.8	Commission	85.3	121.8	434.0	146.4	151.6			
			Own yarn	21.8	31.0	89.4	37.3	38.7			
			Integrated	100.5	143.3	412.8	172.4	178.4			
	Large	23.5	Commission	58.1	87.1	219.8	115.7	118.1			
			Own yarn	19.3	29.0	73.3	38.5	39.3			
			Integrated	18.8	28.3	71.4	37.6	38.3			
	X-Large	58.6	Own yarn	11.8	18.5	46.4	27.8	28.5			
			Integrated	10.1	15.8	39.7	23.8	24.4			

(continued) . . .

Table VII-13 (continued)

Subcategory	Size	Daily capacity	Type plant	Treatment Alternative (PSES) - Existing Sources B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)	(percent)								
8. Nonwoven manufacturing	Small	10.4	NA	21.9	29.3	37.2	32.3	33.5			
	Medium	23.6	NA	8.3	11.8	34.0	14.3	14.7			
	Large	56.7	NA	4.9	7.3	18.6	9.8	10.0			
9. Felted fabric finishing	Small	0.9	NA	21.8	26.8	32.7	28.3	NA			
	Medium	4.4	NA	28.2	40.2	115.8	48.3	NA			
	Large	10.7	NA	302.1	452.8	1,143.4	601.8	NA			

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-14. The textile industry, new source model plants pollution control investment as a percent of fixed assets - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (PSNS) 1/-- new sources			
				Q	R	S	T
		(kkg)		(percent)			
1. (omitted)							
2. Wool finishing	Medium	18.6	Integrated	2.8	4.1	8.5	9.8
3. (omitted)							
4. Woven fabric finishing							
a. Simple processing	Medium	12.3	Commission	13.2	18.8	51.0	54.9
			Own fabric	4.9	7.1	19.2	20.7
			Integrated	1.9	2.8	7.4	8.0
b. Complex processing	Medium	23.3	Commission	11.4	17.1	39.5	43.8
			Own fabric	3.0	4.5	10.4	11.5
			Integrated	1.5	2.2	5.1	5.7
c. Desizing	Medium	53.6	Commission	4.2	6.3	12.8	14.8
			Own fabric	1.8	2.8	5.6	6.4
			Integrated	1.1	1.6	3.3	3.8
5. Knit fabric finishing							
a. Simple processing	Medium	19.3	Commission	7.6	11.3	26.2	29.1
			Integrated	2.7	4.0	9.3	10.3
b. Complex processing	Medium	18.5	Commission	7.2	10.8	24.8	27.5
			Integrated	2.3	3.3	7.7	8.5
c. Hosiery products	Large	12.6	Own hosiery	4.3	6.2	16.8	18.1
			Integrated	3.8	5.5	14.9	16.1
6. Carpet finishing	Medium	48.6	Integrated	3.4	5.1	11.8	13.0
7. Stock & yarn finishing	Medium	9.8	Commission	8.9	12.8	34.5	37.3
			Own yarn	7.2	10.3	27.8	30.0
8. Nonwoven manufacturing	Large	56.7	N.A.	0.8	1.2	2.7	3.0
9. Fleted fabric processing	Medium	4.4	N.A.	2.4	3.4	9.3	10.0

1/ Data for Treatment Alternative A are omitted.
Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-15. The textile industry, new source model plants pollution control investment as percent of fixed assets - direct dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (NSPS) -- new sources A	Q	R	S	T	U
		(kkg)		(percent)					
1. (omitted)									
2. Wool finishing	Medium	18.6	Integrated	14.1	14.3	19.8	13.3	15.7	16.7
3. (omitted)									
4. Woven fabric finishing									
a. Simple processing	Medium	29.6	Commission	7.9	6.3	14.7	21.6	25.1	11.3
			Own fabric	3.3	9.5	6.1	9.0	10.4	4.7
			Integrated	1.7	4.9	3.2	4.6	5.3	2.4
b. Complex processing	Medium	116.3	Commission	12.3	17.8	17.1	10.6	12.3	14.6
			Own fabric	4.7	6.8	6.6	4.1	4.8	5.6
			Integrated	3.2	4.7	4.5	2.8	3.3	3.8
c. Desizing	Medium	53.6	Commission	14.3	14.6	20.1	13.5	15.9	17.0
			Own fabric	6.2	6.3	8.8	5.8	6.9	7.4
			Integrated	3.7	3.8	5.3	3.5	4.2	4.4
5. Knit fabric finishing									
a. Simple processing	Medium	32.2	Commission	17.9	19.7	25.4	17.9	21.1	21.2
			Integrated	6.3	7.0	9.0	6.3	7.5	7.5
b. Complex processing	Medium	18.5	Commission	8.1	23.4	14.9	22.0	25.6	11.5
			Integrated	2.9	8.3	5.3	7.8	9.0	4.1
c. Hosiery products	Medium	5.5	Own hosiery	10.1	46.3	16.0	NA	19.5	13.2
6. Carpet finishing	Small	20.2	Integrated	2.1	7.5	3.7	7.7	8.8	2.9
7. Stock & yarn finishing	Medium	23.4	Commission	15.4	44.5	28.4	41.9	48.8	21.9
			Own yarn	6.3	18.3	11.8	17.3	20.1	9.0
8. Nonwoven manufacturing	Medium	23.6	N.A.	4.9	17.3	8.5	17.7	20.2	6.8
9. Felted fabric processing	Medium	4.4	N.A.	2.9	10.3	5.1	10.6	12.1	4.0

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-16 . The textile industry, existing model plant wastewater controls' annual operating and maintenance expenses - direct dischargers

Subcategory	Size	Daily capacity (kkg)	Treatment alternatives (BAT) -- existing sources										
			A	B	C	D	E	F	G	H	I	J	K
			($1,000)										
								(M	N	P) 1/			
1. Wool scouring	Small	16.2	NA	NA	46.5	122.7	NA	123.1	194.3	147.1	NA	NA	NA
	Medium	35.6	NA	NA	52.2	155.5	NA	152.5	304.5	188.9	NA	NA	NA
	Large	81.0	NA	NA	61.6	215.1	NA	213.4	277.8	269.5	NA	NA	NA
2. Wool finishing	Small	7.4	NA	168.6	NA	200.2	NA	312.1	149.0	268.0	242.7	NA	300.1
	Medium	18.6	NA	259.2	NA	317.1	NA	583.1	271.8	475.3	453.6	NA	533.4
	Large	37.3	NA	391.1	NA	476.9	NA	1,061.6	468.4	796.9	326.3	NA	883.9
3. (Omitted)													
4. Woven fabric finishing													
a. Simple processing	Small	5.4	NA	106.6	51.7	116.2	197.9	261.7	74.4	139.3	106.3	84.3	148.8
	Medium	29.6	NA	167.1	84.2	198.8	196.6	310.9	149.0	266.5	242.7	184.1	298.6
	Large	73.9	NA	257.9	122.9	316.3	389.0	582.4	271.8	474.1	453.6	339.2	532.6
b. Complex processing	Small	23.3	NA	167.1	85.8	198.8	198.0	310.7	149.0	266.5	242.7	185.9	298.6
	Medium	116.3	NA	393.8	175.0	481.7	688.4	1,065.7	468.4	799.7	326.3	580.9	887.6
	Large	193.8	NA	560.3	227.8	687.9	1,082.0	1,542.1	729.4	1,219.3	464.8	886.9	1,346.9
c. Desizing	Small	21.4	NA	167.1	85.8	198.8	198.0	310.9	149.0	266.5	242.7	185.7	298.7
	Medium	53.6	NA	257.9	126.0	316.3	392.0	582.4	271.8	474.1	453.6	342.3	532.6
	Large	178.5	NA	560.3	227.8	687.9	1,082.0	1,542.1	729.4	1,219.3	464.8	886.9	1,346.9
5. Knit fabric finishing													
a. Simple processing	Small	8.0	NA	123.4	60.8	140.4	111.3	190.9	96.1	177.0	148.7	114.4	194.0
	Medium	32.2	NA	207.4	102.9	252.0	284.9	434.0	204.0	358.6	336.2	254.2	403.4
	Large	160.8	NA	560.3	225.6	687.9	1,080.1	1,542.1	729.4	1,219.3	464.8	884.7	1,346.9
b. Complex processing	Small	7.7	NA	123.4	61.7	140.4	112.2	190.9	96.1	177.0	148.7	115.3	194.0
	Medium	18.5	NA	167.1	85.8	198.8	198.0	310.9	149.0	266.5	242.7	185.7	298.7
	Large	30.9	NA	207.4	105.2	252.0	287.2	434.0	204.0	358.6	336.7	256.5	403.4
c. Hosiery products	Small	2.5	79.5	98.1	46.5	103.2	NA	169.5	64.0	121.3	90.8	NA	126.4
	Medium	5.5	95.5	107.1	52.2	116.7	NA	262.1	74.4	139.8	106.3	NA	149.2
6. Carpet finishing	Small	20.2	NA	123.4	61.7	140.4	112.2	190.9	96.1	177.0	148.7	115.3	194.0
	Medium	48.6	NA	167.1	85.8	198.8	198.2	310.9	149.0	266.5	242.7	185.7	298.7
	Large	121.5	NA	257.9	126.0	316.3	392.1	582.4	271.8	474.1	453.6	342.3	532.6
7. Stock & yarn finishing	Small	9.8	NA	123.4	60.8	140.4	111.3	190.9	96.1	177.0	148.7	114.4	194.0
	Medium	23.5	NA	167.1	84.2	198.8	196.6	310.9	149.0	266.5	242.7	184.1	298.6
	Large	39.5	NA	207.4	102.9	252.0	284.9	434.0	204.0	358.6	336.2	254.2	403.4
	X-Large	58.6	NA	257.9	122.9	316.3	389.0	582.4	271.8	474.1	453.6	339.2	532.6
8. Nonwoven manufacturing	Small	10.4	95.5	107.1	52.1	116.4	198.1	261.9	74.4	139.8	106.3	84.7	148.6
	Medium	23.6	118.9	124.4	61.7	140.8	112.2	191.4	96.1	177.9	148.7	115.3	194.4
9. Felted fabric processing	Small	0.9	79.5	98.1	NA	103.2	NA	169.5	64.0	121.3	90.8	NA	126.3
	Medium	2.0	95.5	107.1	NA	116.7	NA	262.0	74.4	139.8	106.3	NA	148.8

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-17. The textile industry, existing model plant wastewater controls' annual operating and maintenance expenses-indirect dischargers

Subcategory	Size	Daily Capacity	Treatment alternatives (PSES) -- existing sources B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)	($1,000)							
1. Wool scouring	Small	16.2	122.9	NA	NA	NA	NA	128.7	197.5	153.7
	Large	81.0	204.2	NA	NA	NA	NA	209.5	285.4	271.9
2. Wool finishing	Small	3.1	131.1	148.0	198.6	104.6	178.5			
	Medium	18.6	285.0	341.8	607.9	601.8	451.2			
	Large	37.3	429.5	520.2	1,033.5	835.4	726.0			
3. (Omitted)										
4. Woven fabric finishing										
a. Simple processing	Small	2.4	98.9	104.0	170.3	121.9	120.9			
	Medium	12.3	131.9	148.7	199.2	185.4	178.5			
	Large	49.3	230.6	274.2	456.1	381.9	350.4			
b. Complex processing	Small	9.7	132.9	149.3	199.8	186.4	NA			
	Medium	23.3	186.5	217.1	329.2	286.2	NA			
	Large	116.3	432.8	523.0	1,036.3	838.7	NA			
c. Desizing	Small	21.4	186.5	217.1	329.2	286.2	NA			
	Medium	53.6	281.5	339.1	605.1	497.8	NA			
	Large	178.5	630.6	757.1	1,611.3	1,289.5	NA			
5. Knit fabric finishing										
a. Simple processing	Small	1.6	98.6	103.8	170.1	121.7	120.8			
	Medium	19.3	184.3	215.8	327.9	284.0	265.9			
	Large	32.2	230.1	273.7	455.6	381.4	350.4			
b. Complex processing	Small	7.7	132.0	149.4	199.9	185.5	178.4			
	Medium	18.5	185.3	217.3	329.4	285.0	265.9			
	Large	46.3	284.5	338.8	604.8	500.7	451.2			
c. Hosiery products	Small	2.5	98.9	104.0	170.3	121.9	120.9			
	Medium	5.5	110.4	119.9	264.9	142.9	140.5			
	Large	12.6	131.9	148.7	199.2	185.4	178.5			
6. Carpet finishing	Small	8.9	110.4	119.9	264.9	142.9	140.5			
	Medium	48.6	185.3	216.5	328.6	285.0	265.9			
	Large	121.5	284.5	340.6	606.6	500.7	451.2			
7. Stock & yarn finishing	Small	4.3	110.0	119.5	264.7	142.5	140.5			
	Medium	9.8	131.1	148.0	198.6	184.6	178.5			
	Large	23.5	184.3	215.8	327.7	284.0	265.9			
	X-Large	58.6	285.0	341.8	607.9	501.8	451.2			
8. Nonwoven manufacturing	Small	10.4	110.4	120.2	265.2	142.9	140.5			
	Medium	23.6	131.9	149.3	199.8	185.4	178.5			
	Large	56.7	185.3	216.5	329.4	285.0	265.9			
9. Felted fabric processing	Small	0.9	99.1	104.3	170.5	122.2	NA			
	Medium	4.4	132.9	149.6	200.3	186.4	NA			
	Large	10.7	186.5	217.5	329.6	286.2	NA			

1/ Treatment alternatives are applicable to wool scouring only.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-18. The textile industry, new source model plant wastewater controls' annual operating and maintenance expenses - indirect dischargers

Subcategory	Size	Daily capacity	Treatment Alternative (PSNS)1/-new sources O	R	S	T
		(kkg)	---------------($1,000)-----------------			
1. (Omitted)						
2. Wool finishing	Medium	18.6	249.8	293.4	401.5	475.4
3. (Omitted)						
4. Woven fabric finishing						
a. Simple processing	Medium	12.3	129.1	139.2	157.6	171.2
b. Complex processing	Medium	23.3	174.8	196.3	238.1	273.1
c. Desizing	Medium	53.6	249.3	292.0	401.5	474.0
5. Knit fabric finishing						
a. Simple processing	Medium	19.3	171.3	192.5	238.1	269.3
b. Complex processing	Medium	18.5	174.8	195.9	238.1	272.7
c. Hosiery products	Large	12.6	130.5	141.0	157.6	172.7
6. Carpet finishing	Medium	48.6	174.8	195.9	238.1	272.7
7. Stock & Yarn finishing	Medium	9.8	129.1	139.2	157.6	170.9
8. Nonwoven manufacturing	Large	56.7	147.8	195.9	238.1	272.7
9. Felted fabric processing	Medium	4.4	131.1	141.9	157.6	173.6

1/ Costs for Treatment Alternative A are omitted.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-19. The textile industry, new source model plant wastewater controls' annual operating and maintenance expenses - direct dischargers

Subcategory	Size	Daily capacity	Treatment alternative (NSPS) - new sources					
			A	Q	R	S	T	U
		(kkg)	($1,000)					
1. (Omitted)								
2. Wool finishing	Medium	18.6	300.4	645.9	473.3	426.2	566.3	358.2
3. (Omitted)								
4. Woven fabric finishing								
a. Simple processing	Medium	29.6	224.3	373.3	304.5	249.2	341.1	255.0
b. Complex processing	Medium	116.3	413.3	651.7	721.8	640.4	849.8	504.1
c. Desizing	Medium	53.6	300.4	645.9	472.4	426.2	562.4	358.2
5. Knit fabric finishing								
a. Simple processing	Medium	32.2	264.4	496.1	380.6	325.3	434.6	306.8
b. Complex processing	Medium	18.5	224.3	373.3	304.1	249.2	341.1	255.0
c. Hosiery products	Medium	5.5	144.1	197.9	166.4	NA	310.1	153.6
6. Carpet finishing	Small	20.2	171.0	250.6	211.7	184.0	262.1	187.5
7. Stock & yarn finishing	Medium	23.4	224.3	373.3	304.5	249.2	339.0	255.0
8. Nonwoven manufacturing	Medium	23.6	171.0	250.6	211.7	184.1	262.1	187.5
9. Felted fabric processing	Medium	4.4	171.0	250.6	212.1	184.1	262.2	187.5

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-20 . The textile industry, existing model plant wastewater controls' annual costs - direct dischargers

Subcategory	Size	Daily capacity	Treatment alternatives (BAT) -- Existing sources										
			A	B	C	D	E	F	G	H	I	J	K
		(Kkg)	($1,000)										
								(M	N	P)1/			
1. Wool scouring	Small	16.2	N.A.	N.A.	66.0	171.0	N.A.	173.0	269.0	212.0	N.A.	N.A.	N.A.
	Medium	35.6	N.A.	N.A.	80.0	220.0	N.A.	214.0	408.0	277.0	N.A.	N.A.	N.A.
	Large	81.0	N.A.	N.A.	104.0	311.0	N.A.	300.0	590.0	407.0	N.A.	N.A.	N.A.
2. Wool finishing	Small	7.4	N.A.	246.0	N.A.	329.0	N.A.	659.0	252.0	440.0	309.0	N.A.	525.0
	Medium	18.6	N.A.	373.0	N.A.	520.0	N.A.	1,133.0	477.0	788.0	549.0	N.A.	931.0
	Large	37.3	N.A.	556.0	N.A.	784.0	N.A.	1,879.0	811.0	1,299.0	827.0	N.A.	1,520.0
3. (omitted)													
4. Woven fabric finishing													
a. Simple processing	Small	5.4	N.A.	150.0	80.0	180.0	246.0	347.0	107.0	210.0	155.0	139.0	239.0
	Medium	29.6	N.A.	244.0	147.0	328.0	477.0	657.0	252.0	439.0	309.0	343.0	523.0
	Large	73.9	N.A.	370.0	226.0	518.0	837.0	1,130.0	477.0	785.0	549.0	638.0	929.0
b. Complex processing	Small	23.3	N.A.	244.0	148.0	328.0	478.0	657.0	252.0	439.0	309.0	345.0	523.0
	Medium	116.3	N.A.	555.0	333.0	786.0	1,355.0	1,880.0	811.0	1,293.0	827.0	1,071.0	1,523.0
	Large	193.8	N.A.	796.0	444.0	1,121.0	2,066.0	2,746.0	1,233.0	1,942.0	1,022.0	1,592.0	2,268.0
c. Desizing	Small	21.4	N.A.	244.0	148.0	328.0	478.0	657.0	252.0	439.0	309.0	345.0	523.0
	Medium	53.6	N.A.	370.0	229.0	518.0	840.0	1,130.0	477.0	785.0	549.0	641.0	929.0
	Large	178.5	N.A.	796.0	444.0	1,121.0	2,066.0	2,746.0	1,233.0	1,942.0	1,022.0	1,592.0	2,268.0
5. Knit fabric finishing													
a. Simple processing	Small	8.0	N.A.	179.0	103.0	229.0	346.0	470.0	154.0	283.0	202.0	208.0	333.3
	Medium	32.2	N.A.	302.0	185.0	416.0	631.0	863.0	358.0	600.0	416.0	484.0	711.0
	Large	160.8	N.A.	796.0	442.0	1,121.0	2,064.0	2,746.0	1,233.0	1,942.0	1,022.0	1,589.0	2,268.0
b. Complex processing	Small	7.7	N.A.	179.0	104.0	229.0	347.0	470.0	154.0	283.0	202.0	209.0	333.0
	Medium	18.5	N.A.	244.0	148.0	328.0	478.0	657.0	252.0	439.0	309.0	354.0	524.0
	Large	30.9	N.A.	302.0	187.0	416.0	633.0	863.0	358.0	600.0	416.0	486.0	711.0
c. Hosiery products	Small	2.5	130.0	134.0	66.0	152.0	N.A.	231.0	85.0	172.0	138.0	N.A.	190.0
	Medium	5.5	161.0	151.0	80.0	181.0	N.A.	347.0	107.0	210.0	155.0	N.A.	239.0
6. Carpet finishing	Small	20.2	N.A.	179.0	104.0	229.0	347.0	470.0	154.0	283.0	202.0	209.0	333.0
	Medium	48.6	N.A.	244.0	148.0	328.0	479.0	657.0	252.0	439.0	309.0	345.0	524.0
	Large	121.5	N.A.	370.0	229.0	518.0	840.0	1,130.0	477.0	785.0	549.0	641.0	929.0

(continued...)

Table VII-20 (continued)

Subcategory	Size	Daily capacity	Treatment alternatives (BAT) -- existing sources										
			A	B	C	D	E	F	G	H	I	J	K
		(Kkg)	($1,000)										
7. Stock & yarn finishing	Small	9.8	N.A.	179.0	103.0	229.0	346.0	470.0	154.0	283.0	202.0	208.0	333.0
	Medium	23.5	N.A.	244.0	147.0	328.0	477.0	657.0	252.0	439.0	309.0	343.0	523.0
	Large	39.5	N.A.	302.0	185.0	416.0	631.0	863.0	358.0	600.0	416.0	484.0	711.0
	X-Large	58.6	N.A.	370.0	226.0	513.0	837.0	1,130.0	477.0	785.0	549.0	638.0	929.0
8. Nonwoven manufacturing	Small	10.4	161.0	151.0	80.0	180.0	247.0	347.0	107.0	210.0	155.0	140.0	239.0
	Medium	23.6	204.0	180.0	104.0	230.0	347.0	470.0	154.0	283.0	202.0	209.0	334.4
9. Felted fabric processing	Small	0.9	130.0	134.0	N.A.	152.0	N.A.	231.0	85.0	172.0	138.0	N.A.	190.0
	Medium	2.0	161.0	151.0	N.A.	181.0	N.A.	347.0	107.0	210.0	155.0	N.A.	239.0

1/ Treatment alternatives M, N and P are applicable to wool scouring only.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-21. The textile industry, existing model plant wastewater controls' annual costs-indirect dischargers

Subcategory	Size	Daily Capacity	Treatment Alternatives (PSES) -- Existing Sources							
			B	D	F	H	J	M1/	N1/	P1/
		(kkg)	($1,000)							
1. Wool scouring	Small	16.2	175.0	NA	NA	NA	NA	195.0	288.0	234.0
	Large	81.0	299.0	NA	NA	NA	NA	329.0	630.0	443.0
2. Wool finishing	Small	3.1	206.0	256.0	498.0	311.0	309.0			
	Medium	18.6	440.0	585.0	1,200.0	856.0	815.0			
	Large	37.3	648.0	878.0	1,906.0	1,393.0	1,298.0			
3. (Omitted)										
4. Woven fabric finishing										
a. Simple processing	Small	2.4	150.0	168.0	247.0	188.0	190.0			
	Medium	12.3	207.0	257.0	498.0	312.0	309.0			
	Large	49.3	357.0	468.0	918.0	656.0	630.0			
b. Complex processing	Small	9.7	208.0	258.0	499.0	313.0	NA			
	Medium	23.3	289.0	371.0	706.0	484.0	NA			
	Large	116.3	658.0	887.0	1,908.0	1,403.4	NA			
c. Desizing	Small	21.4	289.0	371.0	706.0	484.0	NA			
	Medium	53.6	441.0	587.0	1,201.0	856.0	NA			
	Large	178.5	945.0	1,264.0	2,895.0	2,102.0	NA			
5. Knit fabric finishing										
a. Simple processing	Small	1.6	150.0	168.0	247.0	187.0	190.0			
	Medium	19.3	287.0	369.0	705.0	482.0	468.0			
	Large	32.2	356.0	468.0	917.0	655.0	630.0			
b. Complex processing	Small	7.7	207.0	258.0	499.0	312.0	309.0			
	Medium	18.5	288.0	371.0	706.0	483.0	468.0			
	Large	46.3	441.0	504.0	1,198.0	856.0	815.0			
c. Hosiery products	Small	2.5	150.0	168.0	247.0	188.0	190.0			
	Medium	5.5	170.0	201.0	366.0	230.0	230.0			
	Large	12.6	207.0	257.0	498.0	312.0	309.0			
6. Carpet finishing	Small	8.9	170.0	201.0	366.0	230.0	230.0			
	Medium	48.6	288.0	370.0	705.0	483.0	468.0			
	Large	121.5	441.0	584.0	1,200.0	856.0	815.0			
7. Stock & yarn finishing	Small	4.3	170.0	200.0	366.0	229.0	230.0			
	Medium	9.8	206.0	256.0	498.0	311.0	309.6			
	Large	23.5	287.0	369.6	705.0	482.0	468.0			
	X-Large	58.6	440.0	585.0	1,200.0	856.0	815.0			
8. Nonwoven manufacturing	Small	10.4	170.0	201.0	367.0	230.0	230.0			
	Medium	23.6	207.0	258.0	499.0	312.0	309.0			
	Large	56.7	288.0	370.0	706.0	483.0	468.0			
9. Felted fabric finishing	Small	0.9	150.0	169.0	247.0	188.0	NA			
	Medium	4.4	208.0	258.0	500.0	313.0	NA			
	Large	10.7	289.0	371.0	706.0	484.0	NA			

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Source: Effluent Guidelines Division, U. S. Environmental Protection Agency, Development Document.

Table VII-22. The textile industry, new source model plant wastewater controls' annual cost - Indirect Dischargers

Subcategory	Size	Daily Capacity	Treatment alternatives PSNS 1/ -- new sources			
			O	R	S	T
		(kkg)	---------($1,000)--------			
1. (Omitted)						
2. Wool finishing	Medium	18.6	390.0	499.0	808.0	948.0
3. (Omitted)						
4. Woven fabric finishing						
a. Simple processing	Medium	12.3	204.0	238.0	414.0	447.0
b. Complex processing	Medium	23.3	272.0	335.0	544.0	618.0
c. Desizing	Medium	53.6	388.0	499.0	808.0	948.0
5. Knit fabric finishing						
a. Simple processing	Medium	19.3	269.0	331.0	544.0	614.0
b. Complex processing	Medium	18.5	272.0	334.0	544.0	617.0
c. Hosiery products	Large	12.6	205.0	239.0	414.0	449.0
6. Carpet finishing	Medium	48.6	272.0	334.0	544.0	617.0
7. Stock & yarn finishing	Medium	9.8	204.0	238.0	414.0	447.0
8. Nonwoven manufacturing	Large	56.7	272.0	334.0	544.0	617.0
9. Felted fabric processing	Medium	4.4	206.0	240.0	414.0	450.0

1/ Costs for Treatment Alternative A are omitted.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-23. The textile industry, new source model plant wastewater controls' annual costs - direct dischargers

Subcategory	Size	Daily capacity	Treatment alternative (NSPS) - new sources A	Q	R	S	T	U
		(kkg)	($1,000)					
1. (Omitted)								
2. Wool finishing	Medium	18.6	783.0	1,138.0	1,154.0	859.0	1,077.0	932.0
3. (Omitted)								
4. Woven fabric finishing								
a. Simple processing	Medium	29.6	346.0	726.0	530.0	560.0	708.0	428.0
b. Complex processing	Medium	116.3	1,184.0	1,727.0	1,789.0	1,271.0	1,586.0	1,416.0
c. Desizing	Medium	53.6	783.0	1,138.0	1,151.0	859.0	1,074.0	932.0
5. Knit fabric finishing								
a. Simple processing	Medium	32.2	635.0	904.0	908.0	674.0	851.0	746.0
b. Complex processing	Medium	18.5	346.0	726.0	529.0	560.0	708.0	428.0
c. Hosiery products	Medium	5.5	210.0	500.0	271.0	NA	435.0	240.0
6. Carpet finishing	Small	20.2	257.0	556.0	361.0	480.0	601.0	306.0
7. Stock & yarn finishing	Medium	23.4	346.0	726.0	530.0	560.0	706.0	428.0
8. Nonwoven manufacturing	Medium	23.6	257.0	556.0	361.0	480.0	601.0	306.0
9. Felted fabric processing	Medium	4.4	257.0	556.0	361.0	480.0	601.0	306.0

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

increased in increments to correspond with the expected outlays. The data in the above tables reflect the costs after all the outlays have been made and when the facilities are in full operation.

To depict the magnitude of the treatment alternatives' total yearly costs for each model, Tables VII-24, VII-25, VII-26 and VII-27 present the costs expressed as a percent of the models' respective total sales.

3. Treatment Costs for Water Jet Weavers

As indicated in Table 2, water jet weavers will be required to meet BCT (Alternative A) only. Treatment costs for Alternatives A through D are listed below for comparative purposes.

Water Jet Weavers

		Treatment Alternatives			
		A	B	C	D
		($1,000)			
Small (4.8 kkg/day)	Investment	308.0	206.0	133.0	303.0
	Annual costs	162.0	150.0	80.0	180.0
Medium (10.9 kkg/day)	Investment	404.0	263.0	200.0	420.0
	Annual costs	207.0	180.0	104.0	230.0

Investment requirements for Alternative A as a percent of fixed assets are 40.4 percent and 23.4 percent for the small and medium models, respectively. Annual costs for the alternative are 3.7 percent and 2.1 percent of sales for the small and medium models, respectively.

D. Treatment Options Considered

After a cost analysis of each of the alternative treatment technologies, specific options were identified for consideration as the limitation guidelines and standards of performance. From the analysis (described in the Development Document), the more sophisticated technologies involving activated carbon and ozone were excluded from further consideration because they were determined to be too costly, energy intensive, and the pollutant reductions associated with the more sophisticated technologies were obtainable with the other technologies. These options which correspond, in most cases, to the alternative treatment technologies are listed and described in Table VII-28. The aggregate investment and annualized costs associated with those plants requiring additional expenditures are listed below for each BAT and PSES option considered. The costs of BAT Option 1 reflect the BPT expenditures required for those plants presently not meeting BPT treatment levels in the hosiery products (5c), nonwoven manufacturing (8), and felted fabric processing (9) subcategories. Total industry costs by option are summarized below.

Table VII-24. The textile industry, model plants wastewater controls' estimated total yearly costs expressed as a percent of sales - direct dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (BAT) -- existing sources										
				A	B	C	D	E	F	G	H	I	J	K
		(kkg)		(percent)										
									(M	N	P) 1/			
1. Wool Scouring	Small	16.2	Commission	NA	NA	3.9	10.1	NA	10.1	15.9	12.4	NA	NA	NA
	Medium	35.6	Commission	NA	NA	2.2	6.1	NA	6.0	11.6	7.8	NA	NA	NA
	Large	81.0	Commission	NA	NA	1.2	3.6	NA	3.5	6.6	4.7	NA	NA	NA
2. Wool Finishing	Small	7.4	Integrated	NA	1.4	NA	1.8	NA	3.6	1.4	2.5	1.8	NA	2.9
	Medium	18.6	Integrated	NA	1.0	NA	1.4	NA	1.7	1.3	2.2	1.6	NA	2.6
	Large	37.3	Integrated	NA	0.5	NA	0.7	NA	1.7	0.8	1.2	0.7	NA	1.4
3. (omitted)														
4. Woven fabric finishing														
a. Simple processing	Small	5.4	Commission	NA	8.4	4.4	10.0	14.3	19.8	6.1	11.8	8.7	7.8	13.3
			Own fabric	NA	2.8	1.5	3.3	4.8	6.6	2.1	3.9	2.9	2.6	4.5
			Integrated	NA	1.5	0.8	1.8	2.6	3.6	1.1	2.1	1.6	1.4	2.4
	Medium	29.6	Commission	NA	2.6	1.5	3.4	4.9	6.8	2.7	4.7	3.4	3.6	5.5
			Own fabric	NA	0.8	0.5	1.0	1.5	2.1	0.8	1.4	1.0	1.1	1.7
			Integrated	NA	0.5	0.3	0.7	1.0	1.3	0.5	0.9	0.7	0.7	1.1
	Large	73.9	Commission	NA	1.6	0.9	2.2	3.5	4.7	2.0	3.3	2.4	2.7	3.9
			Integrated	NA	0.3	0.2	0.5	0.8	1.0	0.4	0.7	0.5	0.6	0.9
b. Complex processing	Small	23.3	Commission	NA	3.3	2.0	4.3	6.3	8.6	3.4	5.9	4.3	4.6	7.0
			Integrated	NA	0.6	0.4	0.8	1.1	1.6	0.6	1.1	0.8	0.8	1.3
	Medium	116.3	Commission	NA	1.3	0.8	1.8	3.2	4.4	1.9	3.1	1.9	2.5	3.6
			Own fabric	NA	0.4	0.3	0.6	1.1	1.5	0.6	1.0	0.6	0.8	1.2
			Integrated	NA	0.4	0.2	0.5	0.9	1.2	0.5	0.9	0.5	0.7	1.0
	Large	193.8	Integrated	NA	0.3	0.1	0.4	0.7	0.9	0.4	0.6	0.3	0.5	0.7
c. Desizing	Small	21.4	Commission	NA	3.6	2.1	4.7	6.8	9.4	3.7	6.5	4.7	5.0	7.6
			Own fabric	NA	1.1	0.6	1.4	2.1	2.9	1.1	2.0	1.4	1.5	2.3
			Integrated	NA	0.7	0.4	0.9	1.2	1.7	0.7	1.2	0.9	0.9	1.4
	Medium	53.6	Commission	NA	2.4	1.0	2.2	3.6	4.9	2.1	3.4	2.5	2.8	4.1
			Own fabric	NA	1.0	0.4	0.9	1.5	2.0	0.9	1.4	1.0	1.1	1.6
			Integrated	NA	0.7	0.3	0.7	1.1	1.4	0.6	1.0	0.7	0.8	1.2
	Large	178.5	Own fabric	NA	0.4	0.2	0.6	1.1	1.4	0.6	1.0	0.5	0.8	1.2
			Integrated	NA	0.5	0.3	0.7	1.2	1.7	0.8	1.2	0.6	1.0	1.4

(continued) . . .

Table VII-24 (continued)

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (BAT) -- existing sources										
				A	B	C	D	E	F	G	H	I	J	K
		(kkg)		(percent)										
5. Knit fabric finishing														
a. Simple processing	Small	8.0	Commission	NA	5.3	3.0	6.7	9.8	13.6	4.6	8.4	6.1	6.1	9.8
			Integrated	NA	1.1	0.6	1.4	2.0	2.8	1.0	1.8	1.3	1.3	2.0
	Medium	32.2	Commission	NA	2.6	1.5	3.5	5.3	7.3	3.1	5.1	3.7	4.1	6.1
			Integrated	NA	0.4	0.2	0.6	0.8	1.1	0.5	0.8	0.6	0.6	1.0
	Large	160.8	Commission	NA	1.3	0.7	1.8	3.3	4.4	2.0	3.2	1.6	2.5	3.6
			Integrated	NA	0.2	0.1	0.3	0.6	0.8	0.4	0.5	0.3	0.5	0.6
b. Complex processing	Small	7.7	Commission	NA	5.5	3.1	6.9	10.2	14.0	4.8	8.7	6.3	6.3	10.1
			Integrated	NA	1.0	0.6	1.3	1.9	2.6	0.9	1.6	1.2	1.2	1.9
	Medium	18.5	Integrated	NA	0.6	0.3	0.7	1.1	1.5	0.6	1.0	0.7	0.8	1.2
	Large	30.9	Commission	NA	2.5	1.5	3.4	5.2	7.1	3.0	5.0	3.6	4.0	5.9
			Integrated	NA	0.4	0.3	0.6	0.9	1.2	0.5	0.8	0.6	0.7	1.0
c. Hosiery products	Small	2.5	Own hosiery	3.1	3.3	1.6	3.7	NA	5.6	2.1	4.2	3.3	NA	4.6
			Integrated	1.2	1.3	0.6	1.4	NA	2.2	0.8	1.6	1.3	NA	1.8
	Medium	5.5	Own hosiery	1.0	0.9	0.5	1.1	NA	2.1	0.7	1.3	1.0	NA	1.4
6. Carpet finishing	Small	20.2	Integrated	NA	0.8	0.4	1.0	1.4	1.9	0.7	1.2	0.9	0.9	1.4
	Medium	48.6	Integrated	NA	0.5	0.3	0.6	0.9	1.2	0.5	0.9	0.6	0.7	1.0
	Large	121.5	Integrated	NA	0.6	0.3	0.8	1.2	1.7	0.7	1.2	0.9	1.0	1.4
7. Stock & yarn finishing	Small	9.8	Commission	NA	6.8	3.8	8.5	12.4	17.1	5.8	10.7	7.8	7.7	12.4
			Own yarn	NA	1.0	0.6	1.3	1.9	2.6	0.9	1.6	1.2	1.2	1.9
			Integrated	NA	2.3	1.3	2.9	4.2	5.8	2.0	3.6	2.6	2.6	4.2
	Medium	23.5	Own yarn	NA	1.4	0.8	1.8	2.6	3.6	1.4	2.5	1.8	1.9	2.9
			Integrated	NA	1.1	0.6	1.4	2.0	2.8	1.1	1.9	1.4	1.5	2.3
	Large	39.1	Own yarn	NA	1.0	0.6	1.4	2.1	2.9	1.2	2.0	1.5	1.6	2.4
			Integrated	NA	0.6	0.3	0.8	1.2	1.6	0.7	1.1	0.8	0.9	1.3
	X-Large	58.6	Integrated	NA	0.5	0.3	0.6	1.0	1.4	0.6	1.0	0.7	0.8	1.2
8. Nonwoven manufacturing	Small	10.4	NA	1.8	1.8	0.9	2.1	3.0	4.2	1.3	2.5	1.8	1.6	2.8
	Medium	23.6	NA	0.8	0.7	0.4	0.9	1.3	1.8	0.6	1.1	0.8	0.8	1.3
9. Felted fabric finishing	Small	0.9	NA	2.9	3.1	NA	3.4	NA	5.3	2.0	3.9	3.1	NA	4.3
	Medium	2.0	NA	2.7	2.6	NA	3.1	NA	6.0	1.9	3.6	2.7	NA	4.1

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.
Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-25. The textile industry, model plant wastewater contols' estimated total yearly costs expressed as a percentage of the sales - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment Alternative (PSES) - Existing Sources							
				B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)		(percent)							
1. Wool scouring	Small	16.2	Commission	18.3	NA	NA	NA	NA	20.1	30.0	24.3
	Large	81.0	Commission	3.4	NA	NA	NA	NA	3.8	7.0	5.1
2. Wool finishing	Small	3.1	Integrated	2.7	3.3	6.4	4.1	4.1			
	Medium	18.6	Integrated	0.8	1.1	2.2	1.6	1.5			
	Large	37.3	Integrated	0.6	0.8	1.8	1.3	1.2			
3. (omitted)											
4. Woven fabric finishing											
a. Simple processing	Small	2.4	Commission	18.4	20.3	30.5	23.1	23.1			
			Own fabric	6.2	6.8	10.2	7.7	7.8			
			Integrated	3.3	3.7	5.5	4.2	4.2			
	Medium	12.3	Commission	5.7	7.0	13.4	8.6	8.5			
			Own fabric	1.7	2.1	4.0	2.6	2.6			
			Integrated	0.8	1.0	1.9	1.3	1.2			
	Large	49.3	Commission	1.7	2.2	4.3	3.1	3.0			
			Own fabric	0.7	0.9	1.7	1.3	1.2			
			Integrated	0.5	0.6	1.3	0.9	0.9			
b. Complex processing	Small	9.7	Commission	7.2	8.8	16.8	10.9	NA			
			Own fabric	2.2	2.6	5.0	3.3	NA			
			Integrated	1.1	1.3	2.4	1.6	NA			
	Medium	23.3	Commission	4.5	5.7	10.7	7.5	NA			
			Own fabric	1.2	1.5	2.8	2.0	NA			
			Integrated	0.7	0.9	1.7	1.2	NA			
	Large	116.3	Commission	1.2	1.7	3.6	2.6	NA			
			Own fabric	0.5	0.7	1.5	1.1	NA			
			Integrated	0.4	0.5	1.2	0.9	NA			
c. Desizing	Small	21.4	Commission	4.6	5.8	10.9	7.7	NA			
			Own fabric	1.4	1.7	3.3	2.3	NA			
			Integrated	0.8	1.0	2.0	1.4	NA			
	Medium	53.6	Commission	1.9	2.5	5.2	3.7	NA			
			Own fabric	0.8	1.0	2.1	1.5	NA			
			Integrated	0.6	0.7	1.5	1.1	NA			
	Large	178.5	Own fabric	0.5	0.6	1.5	1.1	NA			
			Integrated	0.4	0.5	1.2	0.9	NA			

(continued) . . .

Table VII-25 (continued)

Subcategory	Size	Daily capacity	Type plant	Treatment Alternative (PSES) - Existing Sources							
				B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)	(percent)								
5. Knit fabric finishing											
a. Simple processing	Small	1.6	Commission	13.9	15.4	23.1	17.5	17.6			
			Integrated	5.2	5.7	8.6	6.5	6.5			
	Medium	19.3	Commission	4.1	5.2	9.8	6.9	6.6			
			Integrated	0.6	0.8	1.5	1.1	1.0			
	Large	32.2	Commission	3.1	4.0	7.7	5.6	5.4			
			Integrated	0.5	0.7	1.3	1.0	0.9			
b. Complex processing	Small	7.7	Commission	4.2	5.1	9.8	6.3	6.2			
			Integrated	1.3	1.6	3.1	2.0	2.0			
	Medium	18.5	Commission	4.3	5.5	10.3	7.2	7.0			
			Integrated	0.7	0.8	1.6	1.1	1.1			
	Large	46.3	Commission	2.5	3.2	6.6	4.8	4.5			
			Integrated	0.4	0.5	1.1	0.8	0.8			
c. Hosiery products	Small	2.5	Own hosiery	2.7	3.0	4.5	3.4	3.4			
			Integrated	1.5	1.6	2.4	1.8	1.8			
	Medium	5.5	Own hosiery	1.0	1.2	2.3	1.4	1.4			
			Integrated	1.3	1.5	2.8	1.7	1.7			
	Large	12.6	Own hosiery	0.5	0.6	1.2	0.8	0.7			
			Integrated	0.7	0.8	1.6	1.0	1.0			
6. Carpet finishing	Small	8.9	Integrated	1.7	2.0	3.7	2.3	2.3			
	Medium	48.6	Integrated	0.8	1.0	1.9	1.4	1.3			
	Large	121.6	Integrated	0.7	0.9	1.9	1.4	1.3			
7. Stock & yarn finishing	Small	4.3	Commission	19.9	23.1	43.5	26.8	26.9			
			Own yarn	4.0	4.6	8.7	5.4	5.4			
			Integrated	5.0	5.8	11.0	6.8	6.8			
	Medium	9.8	Commission	10.3	12.6	24.1	15.5	15.4			
			Own yarn	2.3	2.8	5.3	3.4	3.4			
			Integrated	2.6	3.2	6.2	4.0	3.9			
	Large	23.5	Commission	7.2	9.2	17.3	12.1	11.7			
			Own yarn	1.6	2.1	3.9	2.7	2.6			
			Integrated	1.5	1.9	3.7	2.6	2.5			
	X-Large	58.6	Own yarn	1.0	1.3	2.7	2.0	1.8			
			Integrated	1.0	1.3	2.7	1.9	1.8			

(continued) . . .

Table VII-25 (continued)

Subcategory	Size	Daily capacity	Type plant	Treatment Alternative (PSES) - Existing Sources							
				B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)	(percent)								
8. Nonwoven manufacturing	Small	10.4	NA	1.6	1.8	3.4	2.1	2.1			
	Medium	23.6	NA	0.8	1.0	1.8	1.2	1.2			
	Large	56.7	NA	0.5	0.6	1.1	0.8	0.8			
9. Felted fabric finishing	Small	0.9	NA	3.4	3.8	5.7	4.3	NA			
	Medium	4.4	NA	2.1	2.6	4.9	3.1	NA			
	Large	10.7	NA	13.2	16.7	31.4	22.1	NA			

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.
Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-26. The textile industry, new source model plants pollution control annualized cost as a percent of sales - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (PSNS) 1/--new sources			
				O	R	S	T
		(kkg)		------------(percent)------------			
1. (omitted)							
2. Wool finishing	Medium	18.6	Integrated	0.7	0.9	1.5	1.7
3. (omitted)							
4. Woven fabric finishing							
a. Simple processing	Medium	12.3	Commission	5.5	6.5	11.0	11.9
			Own fabric	1.6	1.9	3.3	3.6
			Integrated	0.8	0.9	1.6	1.7
b. Complex processing	Medium	23.3	Commission	4.2	5.1	8.3	9.3
			Own fabric	1.1	1.4	2.2	2.4
			Integrated	0.7	0.8	1.3	1.5
c. Desizing	Medium	53.6	Commission	1.7	2.2	3.5	4.1
			Own fabric	0.7	0.9	1.4	1.7
			Integrated	0.5	0.6	1.0	1.2
5. Knit fabric finishing							
a. Simple processing	Medium	19.3	Commission	3.8	4.6	7.6	8.5
			Integrated	0.6	0.7	1.2	1.3
b. Complex processing	Medium	18.5	Commission	4.0	5.0	8.0	9.0
			Integrated	0.6	0.8	1.2	1.4
c. Hosiery products	Large	12.6	Own hosiery	0.5	0.6	1.0	1.1
			Integrated	0.6	0.8	1.3	1.4
6. Carpet finishing	Medium	48.6	Integrated	0.8	0.9	1.5	1.7
7. Stock & yarn finishing	Medium	9.8	Commission	9.9	11.7	20.0	21.6
			Own yarn	2.2	2.6	4.4	4.8
8. Nonwoven manufacturing	Large	56.7	NA	0.5	0.6	1.0	1.2
9. Felted fabric processing	Medium	4.4	NA	2.0	2.4	4.0	4.4

1/ Data for Treatment Alternative A are omitted.
Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-27. The textile industry, new source model plants pollution control annualized cost as percent of sales - direct dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (NSPS) -- new sources					
				A	Q	R	S	T	U
		(kkg)		----------(percent)----------					
1. (omitted)									
2. Wool finishing	Medium	18.6	Integrated	2.1	3.1	3.0	2.3	2.9	2.5
3. (omitted)									
4. Woven fabric finishing									
a. Simple processing	Medium	29.6	Commission	3.5	7.4	5.5	5.8	7.3	4.4
			Own fabric	1.1	2.2	1.7	1.8	2.2	1.3
			Integrated	0.7	1.4	1.1	1.1	1.4	0.9
b. Complex processing	Medium	116.3	Commission	2.7	4.0	4.0	3.0	3.7	3.7
			Own fabric	0.9	1.3	1.3	1.0	1.2	1.1
			Integrated	0.8	1.1	1.1	0.8	1.0	0.9
c. Desizing	Medium	53.6	Commission	3.3	4.9	4.7	3.7	4.6	4.0
			Own fabric	1.4	2.0	1.9	1.5	1.9	1.6
			Integrated	1.3	1.4	1.4	1.1	1.4	1.6
5. Knit fabric finishing									
a. Simple processing	Medium	32.2	Commission	5.3	7.5	7.3	5.7	7.2	6.2
			Integrated	0.8	1.2	1.2	0.9	1.1	1.0
b. Complex processing	Medium	18.5	Commission	4.4	9.2	6.8	7.2	9.1	5.4
			Integrated	1.0	1.6	1.2	1.3	1.6	1.0
c. Hosiery products	Medium	5.5	Own hosiery	1.2	2.8	1.6	NA	2.7	1.4
6. Carpet finishing	Small	20.2	Integrated	0.4	1.0	0.7	0.9	1.1	0.6
7. Stock & yarn finishing	Medium	23.4	Commission	16.7	34.9	25.8	27.3	34.4	14.8
			Own yarn	1.9	4.0	2.9	3.1	3.9	2.3
8. Nonwoven manufacturing	Medium	23.6	N.A.	1.0	2.1	1.4	1.8	2.3	1.2
9. Felted fabric processing	Medium	4.4	N.A.	2.5	5.4	3.5	4.7	5.8	3.0

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-28. Treatment options considered for the textile industry

Performance standards	Option	End-of-pipe treatment technology	Alternative treatment
(Existing sources)			
BAT (and BCT)	1	Biological treatment (BPT)	A
	2	BPT plus filtration	C
	3	BPT plus chemical coagulation	B
	4	BPT plus chemical coagulation and filtration	D
PSES	1	Pretreatment standards based on screening, equalization, and/or neutralization *	A
	2	Pretreatment plus chemical coagulation	B
	3	Pretreatment plus chemical coagulation and filtration	D
(New sources)			
NSPS	1	BPT	A
	2	BPT plus chemical coagulation and filtration	R
	3	Segregate toxic pollutant waste streams from other process-related and non-process related waste streams. Provide chemical coagulation, filtrating and carbon adsorption for toxic pollutant waste streams and biological treatment for other waste stream.	T
PSNS	1	Pretreatment standards based on screening, equalization, and/or neutralization as necessary for compliance with prohibitive discharge provisions (same as PSES Option 1).	A
	2	Pretreatment of all waste plus segregation and chemical coagulation and filtration of toxic pollutant waste streams.	O
	3	Option 2 plus the addition of activated carbon adsorption to the treatment train applied to the toxic stream.	T

*Currently in place.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Total Industry Cost (Before Baseline Closure by Option

	Option	Investment	Annualized
		(million dollars)	
BAT	1	4	2
	2	58	28
	3	71	50
	4	122	68
PSES	2	58	34
	3	80	41
BCT (water jet weavers only)	1	1	1

E. Treatment Options Recommended

Based upon an analyses of the various treatment options, EPA recommended an option for each of the subcategories as the basis for proposed effluent limitations and performance standards (Table VII-29). The total industry investment and annualized costs for implementation of these options are listed below.

Estimated Aggregated Cost of Compliance (Before Baseline Closures) for Recommended Treatment Options

	Option	Investment	Annualized Cost
		($million)	
BAT	Various	65	32
PSES	2	58	34
BCT (water jet weaver)	1	1	1
		124	67

F. Resource Conservation and Recovery Act (RCRA)

Estimated costs for solvent disposal under RCRA Interim Status Standards are listed in Tables VII-30 and VII-31 for direct and indirect discharger models, respectively. Compliance costs include the following components.

1. Initial costs - occur only in the first year and are not depreciated.
2. Annual costs - occur every year.
3. Capital costs - occur only in the first year and are depreciated.
4. Closure costs - occur during the first five years.

Table VII-29. Treatment options proposed

	Options selected	Treatment alternative	Applicable subcategory
BAT	2	C	All except wool finishing and felted fabric processing
	4	D	Wool finishing
	1	A	Felted fabric processing
PSES	2	B	All
NSPS	2	R	All
PSNS	2	0	All
BCT	1	A	Water jet weavers, only

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-30. The textile industry RCRA ISS costs for solvent disposal-direct discharger

Subcategory	Size	Number of plants requiring disposal	Initial	Annual	Capital	Closure
			($1,000)			
1. Wool scouring	Medium	1	6.2	3.5	5.6	2.1
2. Wool finishing	Small	1	6.2	3.4	5.6	2.1
3. Low water use processing	Not applicable					
4. Woven fabric finishing						
a. Simple processing	Small	3	6.2	3.3	5.6	2.1
	Medium	2	6.2	3.4	5.6	2.1
	Large	1	6.2	3.6	5.6	2.1
b. Complex processing	Small	1	6.2	3.4	5.6	2.1
	Medium	1	6.2	3.8	5.6	2.1
c. Desizing	Small	2	6.2	3.4	5.6	2.1
	Medium	1	6.2	3.8	5.6	2.1
	Large	2	6.2	4.0	5.6	2.1
5. Knit fabric finishing						
a. Simple processing	Small	2	6.2	3.4	5.6	2.1
	Medium	2	6.2	3.5	5.6	2.1
	Large	1	6.2	3.9	5.6	2.1
b. Complex processing	Small	1	6.2	3.4	5.6	2.1
	Medium	1	6.2	3.4	5.6	2.1
	Large	1	6.2	3.4	5.6	2.1
c. Hosiery products	Small	1	6.2	3.3	5.6	2.1
6. Carpet finishing	Small	1	6.2	3.4	5.6	2.1
	Medium	1	6.2	3.5	5.6	7.1
7. Stock & yarn finishing	Small	3	6.2	3.4	5.6	2.1
	Medium	1	6.2	3.4	5.6	2.1
	Large	1	6.2	3.5	5.6	2.1
	X-Large	1	6.2	3.6	5.6	2.1
8. Nonwoven manufacturing	Small	2	6.2	3.4	5.6	2.1
9. Felted fabric processing	Small	1	6.2	3.3	5.6	2.1

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table VII-31. The textile industry RCRA ISS costs for solvent disposal-indirect discharger

Subcategory	Size	Number of plants requiring disposal	Initial	Annual	Capital	Closure
			($1,000)			
1. Wool scouring	Small	1	6.2	3.4	5.6	2.1
2. Wool finishing	Small	3	6.2	3.3	5.6	2.1
	Medium	1	6.2	3.4	5.6	2.1
3. Low water use processing			Not applicable			
4. Woven fabric finishing						
a. Simple processing	Small	8	6.2	3.3	5.6	2.1
	Medium	11	6.2	3.4	5.6	2.1
	Large	4	6.2	3.8	5.6	2.1
b. Complex processing	Small	3	6.2	3.4	5.6	2.1
	Medium	3	6.2	3.4	5.6	2.1
	Large	2	6.2	3.8	5.6	2.1
c. Desizing	Small	3	6.2	3.4	5.6	2.1
	Medium	2	6.2	3.5	5.6	2.1
	Large	1	6.2	4.0	5.6	2.1
5. Knit fabric finishing						
a. Simple processing	Small	12	6.2	3.3	5.6	2.1
	Medium	12	6.2	3.4	5.6	2.1
	Large	4	6.2	3.8	5.6	2.1
b. Complex processing	Small	3	6.2	3.4	5.6	2.1
	Medium	2	6.2	3.4	5.6	2.1
	Large	2	6.2	3.5	5.6	2.1
c. Hosiery products	Small	20	6.2	3.3	5.6	2.1
	Medium	3	6.2	3.3	5.6	2.1
6. Carpet finishing	Small	3	6.2	3.4	5.6	2.1
	Medium	3	6.2	3.5	5.6	2.1
	Large	1	6.2	3.8	5.6	2.1
7. Stock & yarn finishing	Small	14	6.2	3.3	5.6	2.1
	Medium	7	6.2	3.4	5.6	2.1
	Large	4	6.2	3.4	5.6	2.1
	X-Large	2	6.2	3.5	5.6	2.1
8. Nonwoven manufacturing	Small	3	6.2	3.4	5.6	2.1
	Medium	1	6.2	3.4	5.5	2.1
9. Felted fabric processing	Small	1	6.2	3.3	5.6	2.1
	Medium	1	6.2	3.3	5.6	2.1

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Total industry costs are estimated as follows.

	Total Costs			
	Initial	Annual	Capital	Closure
	($1,000)			
Direct Dishcargers	222.4	125.1	200.7	75.6
Indirect Dischargers	864.9	474.8	780.6	294.6

VIII. PROJECTED ECONOMIC IMPACTS

The imposition of wastewater control requirements on the textile industry will result in economic impacts for the industry since it will be required to make expenditures which, for all practical purposes, will not result in improved operating efficiency. Thus, the industry's profitability will be reduced even if only by a very small amount. However for certain plants the impact will be quite severe. As the capital and annual operating and maintenance expenditures for wastewater controls increase, the resulting economic impacts become more significant. The purpose of this chapter is to describe the various economic impacts associated with the treatment alternatives described in Chapter VII and to project the economic ramifications of mills incurring the associated expenditures.

For purposes of this analysis, economic impacts are assessed for each of the model plants described in Chapter VI utilizing the various wastewater control alternatives' costs presented in Chapter VII. The economic impact methodology, described in Chapter II, was primarily based on a net present value (NPV) analysis to determine the models' required price increases necessary to offset control expenditures and the financial impacts attributable to the control expenditures. Utilizing this information and other industry economic characteristics described in this report, the industry's ability to increase prices is assessed. Other economic impacts such as plant closures, production impacts, employment losses, community effects, dislocation effects, and balance of trade effects are assessed for each of the treatment options described in the preceding chapter.

The chapter is organized to examine impacts on the following regulations.

- Best Available Technology Economically Achievable (BAT)
- Best Conventional Pollutant Control Technology (BCT)
- Pretreatment Standards for Existing Sources (PSES)
- New Source Performance Standards (NSPS)
- Pretreatment Standards for New Sources (PSNS)

The discussion of each regulatory area includes four major impact variables.

1. Required price increases
2. Financial effects
3. Production effects
4. Effects of combining RCRA costs with wastewater control costs

Each of these is discussed briefly below (See Chapter II for complete discussion of the methodology).

Required Price Increase - An implicit indicator of the expected price effects attributable to the imposition of wastewater controls used in this analysis was the amount of sales price increase required to maintain profitability, after control expenditures, at a level equal to that prior to control expenses. The method of the computation of this required price increase was described in detail in Chapter II (Methodology) of this report. The ability of mills to pass on such required price increases is evaluated in Section D of this chapter.

The textile industry is expected to be limited in its ability to increase prices to recover expenditure requirements for wastewater controls. Accordingly, this analysis describes impacts based on the assumption of no price increases.

Financial Effects - Based on the model profiles described in Chapter VI and the estimated cost of wastewater control described in Chapter VII, the following financial indicators were computed for the base case (without wastewater controls considered) and the regulated case (with wastewater controls considered).

- After-tax Return on Sales
- After-tax Return on Total Assets
- Annual Cash Flow
- Net Present Value

These indicators were computed for each model according to the net present value (NPV) and accounting procedures outlined in Chapter II, Methodology. It should be noted that unlevel discounted cash flow procedures were used in determining the models' NPV's. That is, for each of the twenty-one years, independent cash flows were computed based on certain assumptions of inflation, profitability, depreciation, and reinvestment. Accordingly, the after-tax returns on sales and total assets varied slightly from year to year. To compensate for this, a 21-year average was computed for each return. Annual cash flows and NPV's also varied from year to year; however, for these indicators, the respective amounts in year 21 were used. This procedure was used to view the cash flow and NPV effects of wastewater control expenditures at the end of a 21-year period. Because of these procedures, the base case financial indicators may differ slightly from similar indicators presented in Chapter VI, Model Plants.

After-tax return on sales reflects the general level of profitability in an industry. The returns of the models reflect the low level of profits typically experienced by the textile industry. The imposition of wastewater control requirements on the industry contributes to a further reduction of its returns.

Due to the relative age of most of the mills, their respective assets have been substantially depreciated. Consequently, some of the models' average returns on total assets were relatively high in the base case. The imposition of wastewater control expenditures on the models resulted in impacts (e.g. reductions in the returns) similar to those impacts associated with the models' returns on sales.

The models' annual cash flows were based on data reflective of the 21st year and were computed by adding the model's after-tax profits to their respective depreciations. Cash flows are significant in that they represent an inflow (or outflow) of dollars to the models' operations. Thus, even if the mills' profits were negative, they could maintain operations in the short-run if they could sustain positive cash flows.

The model plant net present values (NPV) discounts the plant's future cash flows to present day values at the current nominal cost of capital estimated at 10 percent (See Section IV.C.7 for discussion on the industry's cost of capital). The net present value concept indicates the size of the return to the equity holders in excess of the firm's 10.0 percent cost of capital; thus, if the NPV was positive, it was assumed the particular firm was earning a return during the 21 year period in excess of the minimum return necessary to attract investors (the cost of capital). If the NPV was negative, then the firm's return was less than the minimum cost of capital.

Production Effects - Production effects may result from two sources: plant closures resulting from the economic impact of regulations, and production decreases in existing plants resulting from production curtailments or reduction resulting from regulatory action.

Plant closures may result from the inability of less profitable plants to adequately recover required pollution abatement costs through increased product price. The plant closure criteria used in this analysis is based upon the net present value of future cash flow discounted at the industry cost of capital. Thus if a firm net present value (after controls) exceeds their cost of capital it is in the firm's best interest to continue operation. If their NPV's are negative then it is assumed the firm would liquidate, realize salvage value in cash and reinvest in a more financially viable investment (one which would earn at least their cost of capital).

Because of the large number of model plants considered, the number of control alternatives and the number of financial parameters calculated for each alternative, formalized closure criteria were developed to assist in the identification of those segments where plant closures may be expected. In the development of these criteria, certain assumptions were necessary to simplify the interpretation of the impact results.

The closure criteria utilized are depicted below. These criteria basically represent the models' abilities to continue operations after incurring expenditures for wastewater controls.

Model's Viability	Net Present Value	Annual Cash Flow
Viable	Positive	Positive
Marginal	Slightly Negative 1/	Slightly Positive 1/
Closure	Negative	Negative

Based on the above criteria, closure decisions are made for each model at each treatment level. The number of existing facilities associated with the representative models which will cease operations due to wastewater control expenditure requirements are projected utilizing the following methodology.

(1) Based on the NPV closure criteria described previously, the subcategories and associated models projected to close are identified.

(2) Once identified, the following factors are considered in the determination of the number of actual existing plant closures associated with each projected model plant closure.

    (a) The number of existing facilities associated with the model.

    (b) Historical trends for existing facilities within the subcategory as well as projections of the subcategory's future expectations (baseline closures).

    (c) The severity by which the model's financial data are reduced. Are the financial data substantially reflective of closure or are the data reflective of a borderline situation?

    (d) Review the overall economic viability of the segment.

(3) Based on the above the number of existing facilities projected to close is made. These projections are determined quantitatively, based on the analyst's knowledge of business and economic principles as well as the analyst's knowledge of the industry.

Baseline closures are first estimated and excluded from the estimated plant closures resulting from control alternatives.

1/ The criterion utilized here was that the positive cash flow must be greater than the amount by which the NPV was negative or a positive NPV must be greater than the amount by which the cash flow was negative. If not, then the plant was projected to close.

Table VIII- 1. The textile industry, representative existing model plants impacts, average required price increase necessary to offset expenditures for wastewater controls - direct dischargers.

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (BAT) -- existing sources										
				A	B	C	D	E	F	G	H	I	J	K
		(kkg)		(percent)										
									(M	N	P) 1/			
1. Wool scouring	Small	16.2	Commission	NA		1.0	2.7	NA	2.7	4.3	3.4	NA	NA	NA
	Medium	35.6	Commission	NA		0.6	1.6	NA	1.6	3.0	2.2	NA	NA	NA
	Large	81.0	Commission	NA		0.4	1.0	NA	1.0	2.2	1.0	NA	NA	NA
2. Wool finishing	Small	7.4	Integrated	NA	0.5	NA	0.7	NA	1.5	0.5	0.9	0.5	NA	1.1
	Medium	18.6	Integrated	NA	0.3	NA	0.5	NA	0.4	0.5	0.8	0.4	NA	1.0
	Large	37.3	Integrated	NA	0.2	NA	0.3	NA	0.7	0.3	0.4	0.3	NA	0.5
3. (Omitted)														
4. Woven fabric finishing														
a. Simple processing	Small	5.4	Commission	NA	1.9	1.0	2.3	2.8	4.1	1.2	2.7	2.0	2.0	3.2
			Own fabric	NA	0.5	0.3	0.7	0.9	1.4	0.4	0.8	0.6	0.6	1.2
			Integrated	NA	0.5	0.3	0.6	0.8	1.1	0.4	0.7	0.5	0.5	0.9
	Medium	29.6	Commission	NA	0.9	0.6	1.2	2.1	2.4	1.0	1.3	0.9	1.4	1.7
			Own fabric	NA	0.3	0.2	0.4	0.7	0.9	0.3	0.5	0.3	0.4	0.6
			Integrated	NA	0.2	0.1	0.2	0.4	0.6	0.2	0.3	0.2	0.3	0.4
	Large	73.9	Commission	NA	0.5	0.4	0.8	1.5	1.9	0.8	1.2	0.7	1.1	1.5
			Integrated	NA	0.1	0.1	0.2	0.3	0.4	0.2	0.3	0.2	0.2	0.3
b. Complex processing	Small	23.3	Commission	NA	1.0	0.7	1.2	2.4	2.1	1.2	1.7	0.9	1.4	2.0
			Integrated	NA	0.2	0.1	0.3	0.5	0.7	0.2	0.4	0.2	0.3	0.5
	Medium	116.3	Commission	NA	0.4	0.3	0.7	1.3	1.6	0.7	1.1	0.9	1.0	1.4
			Own fabric	NA	0.1	0.1	0.2	0.4	0.6	0.2	0.4	0.3	0.3	0.5
			Integrated	NA	0.1	0.1	0.2	0.4	0.5	0.2	0.3	0.2	0.3	0.4
	Large	193.8	Integrated	NA	0.1	0.1	0.1	0.3	0.3	0.2	0.2	0.1	0.2	0.3
c. Desizing	Small	21.4	Commission	NA	1.1	0.8	1.3	2.7	2.3	1.3	1.9	1.0	1.5	2.1
			Own fabric	NA	0.4	0.2	0.5	0.9	1.2	0.4	0.7	0.4	0.6	0.9
			Integrated	NA	0.2	0.1	0.3	0.6	0.7	0.3	0.4	0.3	0.4	0.5
	Medium	53.6	Commission	NA	1.0	0.4	0.8	1.6	2.0	0.8	1.3	0.7	1.1	1.6
			Own fabric	NA	0.4	0.2	0.3	0.6	0.8	0.3	0.5	0.3	0.5	0.6
			Integrated	NA	0.3	0.1	0.2	0.5	0.6	0.2	0.4	0.2	0.3	0.5
	Large	178.5	Own fabric	NA	0.1	0.1	0.2	0.4	0.5	0.2	0.4	0.2	0.3	0.4
			Integrated	NA	0.2	0.1	0.2	0.5	0.6	0.3	0.4	0.3	0.4	0.5
5. Knit fabric finishing														
a. Simple processing	Small	8.0	Commission	NA	1.2	1.1	2.0	3.2	4.8	1.1	1.7	1.5	1.9	2.1
			Integrated	NA	0.4	0.2	0.5	1.0	1.3	0.3	0.6	0.4	0.5	0.8
	Medium	32.2	Commission	NA	0.9	0.6	1.3	2.3	3.0	1.2	1.9	1.1	1.6	2.3
			Integrated	NA	0.1	0.1	0.2	0.4	0.5	0.2	0.3	0.2	0.3	0.4
	Large	160.8	Commission	NA	0.4	0.3	0.6	1.3	1.7	0.8	1.1	0.7	1.0	1.4
			Integrated	NA	0.1	0.0	0.1	0.2	0.3	0.1	0.2	0.1	0.2	0.2

continued...

Table VIII-1. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Treatment alternatives (BAT) -- existing sources A (percent)	B	C	D	E	F	G	H	I	J	K
5. Knit fabric finishing (continued)														
b. Complex processing	Small	7.7	Commission	NA	1.4	1.2	2.0	3.3	4.9	1.2	1.8	1.5	1.9	2.1
			Integrated	NA	0.3	0.2	0.5	0.9	1.2	0.3	0.6	0.4	0.5	0.7
	Medium	18.5	Integrated	NA	0.2	0.1	0.3	0.5	0.6	0.2	0.4	0.2	0.3	0.5
	Large	30.9	Commission	NA	0.8	0.6	1.3	2.3	2.9	1.2	1.9	1.0	1.6	2.3
			Integrated	NA	0.1	0.1	0.2	0.4	0.5	0.2	0.3	0.2	0.3	0.4
c. Hosiery products	Small	2.5	Own hosiery	0.7	0.7	0.3	0.8	NA	1.2	0.4	0.9	0.8	NA	1.0
			Integrated	0.4	0.4	0.2	0.5	NA	0.7	0.3	0.5	0.4	NA	0.6
	Medium	5.5	Own hosiery	0.4	0.3	0.2	0.4	NA	0.7	0.2	0.4	0.3	NA	0.5
6. Carpet finishing	Small	20.2	Integrated	NA	0.3	0.2	0.4	0.7	0.9	0.2	0.4	0.3	0.3	0.5
	Medium	48.6	Integrated	NA	0.2	0.1	0.2	0.4	0.5	0.2	0.3	0.2	0.3	0.4
	Large	121.5	Integrated	NA	0.2	0.1	0.3	0.5	0.7	0.3	0.4	0.2	0.4	0.5
7. Stock & yarn finishing	Small	9.8	Commission	NA	1.6	1.3	2.2	5.1	6.2	1.7	2.8	1.7	2.3	3.5
			Own yarn	NA	0.3	0.2	0.5	0.9	0.9	0.3	0.6	0.4	0.5	0.6
			Integrated	NA	0.8	0.5	1.0	2.1	2.4	0.7	1.1	0.8	1.0	1.4
	Medium	23.5	Own yarn	NA	0.5	0.3	0.7	1.2	1.5	0.5	0.9	0.5	0.8	1.1
			Integrated	NA	0.4	0.2	0.5	0.9	1.2	0.4	0.7	0.4	0.6	0.9
	Large	39.1	Own yarn	NA	0.4	0.2	0.5	0.9	1.2	0.5	0.8	0.4	0.6	0.9
			Integrated	NA	0.2	0.1	0.3	0.5	0.7	0.3	0.4	0.2	0.4	0.5
	X-Large	58.6	Integrated	NA	0.2	0.1	0.2	0.4	0.6	0.2	0.4	0.2	0.3	0.4
8. Nonwoven manufacturing	Small	10.4	N.A.	0.7	0.6	0.3	0.7	0.9	1.3	0.4	0.9	0.6	0.6	1.0
	Medium	23.6	N.A.	0.3	0.2	0.1	0.3	0.6	0.8	0.2	0.4	0.3	0.3	0.5
9. Felted fabric processing	Small	0.9	N.A.	1.1	1.0	NA	1.2	NA	1.7	0.6	1.3	1.1	NA	1.5
	Medium	2.0	N.A.	1.0	0.8	NA	1.1	NA	1.7	0.6	1.2	0.9	NA	1.5

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Effects of combining RCRA costs with control costs. The impacts of RCRA costs were analyzed in two steps. First, the RCRA costs were applied to the model plants without BAT controls using the same methodology as was used for effluent control; second, RCRA costs were combined with the costs of treatment alternatives. Actually RCRA costs were very minor so the resulting impacts were of little significance.

A. Best Available Technology Economically Achievable (BAT)

BAT effluent limitations are being considered for existing sources discharging directly to receiving waters. Excluding the low water use processors (subcategory 3), an estimated 164 (of 198) plants will be required to install end-of-pipe treatment technology. As indicated in Chapter VII, 9 treatment alternatives (A through K) were costed and analyzed for most of the subcategories. Based on a cost analysis of each of the treatments, as discussed in the Development Document, specific alternatives were identified as options for consideration (Options 1-4).

1. Required Price Increases

The required price increases necessary to maintain baseline profitability levels after the imposition of controls are shown in Table VIII-1. The price increase information is shown by subcategory, size of plant, plant type and treatment alternative. In general the price increases demonstrate a great deal of variability in the levels of impact depending upon plant size, type of plant and control options. For example, the price increases range from a low of 0.1 percent for large integrated woven fabric mills when considering treatment alternative B to a high of 6.2 percent for small stock and yarn finishing plants considering alternative F.

As an example of the information contained in the table and some of the general patterns that are evident, an example from the woven fabric finishing subcategory is used.

In woven fabric finishing, the largest increases are required by the small simple processing models. Under Treatment Alternative F, the small commission model requires an increase of 4.1 percent; the own fabric requires an increase of 1.4 percent; the integrated model, 1.1 percent.

Under Alternative C (Option 2), the increases are 1.0, 0.3, and 0.3 percent for the commission, own fabric, and integrated models, respectively. Under Alternative D (Option 4), the increases are about twice as high as those under Alternative C (Option 2). For the other size categories in the woven subcategory, the differences in required price increases are not significant among the three subdivisions (simple, complex, and desizing) when comparing the same type mills of similar production sizes. This can be illustrated by comparing the data for the medium simple, small complex, and small desizing models.

Subdivision	Daily Capacity (kkg)	Type Plant	Treatment Alternative C (Option 2)	Treatment Alternative F
Simple	29.6	Commission	0.6	2.4
		Own fabric	0.2	0.9
		Integrated	0.1	0.6
Complex	23.3	Commission	0.7	2.1
		Own fabric	NA	NA
		Integrated	0.1	0.7
Desizing	21.4	Commission	0.8	2.3
		Own fabric	0.2	1.2
		Integrated	0.1	0.7

For the commission models, the required increases varied from 2.1 percent to 2.4 percent under Alternative F and from 0.6 percent to 0.8 percent under Alternative C (Option 2). Under Alternative F for the own fabric models, the increase is 0.9 percent for the simple subdivision and 1.2 percent for the desizing. Under Alternative C, the increases are identical among the subdivision for the own fabric models and the integrated models. For the remaining woven models, the required increases are generally small. Under Alternative C (Option 2), the increases for the commission models are 0.4 percent or less for all sizes and subdivision. Under the same alternative the increases for the own fabric and integrated models are 0.2 percent or less.

2. Financial Effects

The changes in the financial profiles of the model plants resulting from the cost of BAT controls are based on the assumption of no price increases.

a. Return on Sales

The 21-year average after-tax return on sales under baseline conditions and after BAT controls are presented in Table VIII-2 with the percentage reductions in income shown on Table VIII-3. The same pattern of impacts as demonstrated in Table VIII-1 is evident. The smaller sized plants and treatment alternatives E, F, G, and H generally demonstrate the highest level of impacts. The after-tax return on sales criteria should be viewed first under baseline conditions then under the control alternatives, as significant differences occur in the baseline conditions. For example, in the wool scouring subcategory baseline profitability is very low and control alternatives further enhance this condition. Negative returns are

Table VIII-2. The textile industry, representative model plant impacts, effects of wastewater control expenditures on average after-tax return on sales-direct dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives A	B	C	D	E	(BAT) F	-- existing sources G	H	I	J	K
		(kkg)		(percent)											
										(M	N	P)1/			
1. Wool scouring	Small	16.2	Commission	-3.4	NA	NA	-6.0	-10.1	NA	-10.2	-14.1	-11.6	NA	NA	NA
	Medium	35.6	Commission	0.4	NA	NA	-0.9	-3.6	NA	-3.5	-7.4	-4.6	NA	NA	NA
	Large	81.0	Commission	1.9	NA	NA	1.5	0.4	NA	0.4	-0.8	-0.1	NA	NA	NA
2. Wool finishing	Small	7.4	Integrated	1.6	NA	1.1	NA	1.0	NA	0.4	1.1	0.9	0.9	NA	0.6
	Medium	18.6	Integrated	1.2	NA	0.9	NA	0.7	NA	0.5	0.8	0.5	0.6	NA	0.3
	Large	37.3	Integrated	3.7	NA	3.5	NA	3.4	NA	3.1	3.4	3.2	3.4	NA	3.2
3. (Omitted)															
4. Woven fabric finishing															
a. Simple processing	Small	5.4	Commission	1.8	NA	-3.2	-0.4	-4.0	-7.6	-11.1	-1.6	-5.2	-3.3	-2.4	-6.0
			Own fabric	1.0	NA	-0.5	0.4	-0.7	-1.9	-3.1	0.1	-1.1	-0.5	-0.2	-1.4
			Integrated	2.3	NA	1.8	2.0	1.7	1.3	1.0	1.9	1.6	1.8	1.8	1.5
	Medium	29.6	Commission	2.1	NA	1.2	1.6	0.9	0.5	-0.4	1.2	0.4	0.8	0.9	0.0
			Own fabric	1.5	NA	1.2	1.3	1.1	1.0	0.8	1.2	1.0	1.1	1.1	0.9
			Integrated	2.7	NA	2.5	2.6	2.5	2.4	2.3	2.5	2.4	2.4	2.5	2.3
	Large	73.9	Commission	4.1	NA	3.5	3.8	3.3	3.0	2.6	3.4	2.9	3.1	3.2	2.8
			Integrated	3.1	NA	3.0	3.0	2.9	2.8	2.7	2.9	2.8	2.9	2.9	2.8
b. Complex processing	Small	23.3	Commission	2.2	NA	0.9	1.5	0.5	-0.1	-1.4	0.9	-0.3	0.3	0.5	-0.8
			Integrated	2.7	NA	2.5	2.5	2.4	2.3	2.2	2.5	2.3	2.4	2.4	2.2
	Medium	116.3	Commission	2.0	NA	1.6	1.8	1.4	1.0	0.5	1.4	1.0	1.5	1.2	0.8
			Own fabric	2.0	NA	1.8	1.9	1.8	1.7	1.5	1.8	1.7	1.8	1.7	1.6
			Integrated	3.0	NA	2.9	3.0	2.9	2.8	2.6	2.9	2.7	2.9	2.8	2.7
	Large	193.8	Integrated	3.0	NA	2.9	3.0	2.9	2.8	2.7	2.9	2.8	2.9	2.9	2.8
c. Desizing	Small	21.4	Commission	2.4	NA	1.0	1.6	0.6	0.0	-1.5	1.0	-0.2	0.4	0.5	-0.8
			Own fabric	1.5	NA	1.1	1.3	1.0	0.9	0.6	1.1	0.8	1.0	1.0	0.7
			Integrated	2.7	NA	2.5	2.6	2.4	2.4	2.2	2.5	2.3	2.4	2.4	2.3
	Medium	53.6	Commission	4.2	NA	3.5	3.9	3.5	3.1	2.7	3.5	3.1	3.3	3.3	2.9
			Own fabric	2.4	NA	2.1	2.3	2.1	2.0	1.8	2.1	1.9	2.0	2.0	1.9
			Integrated	3.1	NA	2.9	3.0	2.9	2.8	2.6	2.9	2.7	2.8	2.8	2.7
	Large	178.5	Own fabric	2.0	NA	1.8	1.9	1.8	1.6	1.5	1.8	1.6	1.8	1.7	1.6
			Integrated	3.1	NA	2.9	3.0	2.8	2.7	2.5	2.8	2.7	2.9	2.8	2.6
5. Knit fabric finishing															
a. Simple processing	Small	8.0	Commission	2.7	NA	0.4	1.6	-0.2	-0.9	-3.2	0.9	-1.2	-0.1	0.3	-1.9
			Integrated	2.5	NA	2.1	2.3	2.0	1.9	1.7	2.2	1.9	2.0	2.1	1.8

continued . . .

Table VIII-2. (continued)

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (BATEA) -- existing sources										
					A	B	C	D	E	F	G	H	I	J	K
		(kkg)		(percent)											
5. Knit fabric finishing (cont'd)															
a. Simple processing	Medium	32.2	Commission	3.8	NA	2.9	3.3	2.6	2.2	1.4	2.8	2.1	2.4	2.5	1.8
			Integrated	2.9	NA	2.7	2.8	2.7	2.6	2.5	2.7	2.6	2.7	2.7	2.6
	Large	160.8	Commission	3.7	NA	3.2	3.5	3.1	2.7	2.3	3.0	2.6	3.2	2.9	2.5
			Integrated	2.9	NA	2.8	2.8	2.8	2.7	2.6	2.7	2.7	2.8	2.7	2.6
b. Complex processing	Small	7.7	Commission	2.7	NA	0.3	1.5	-0.3	-1.0	-3.4	0.8	-1.3	-0.2	0.2	-2.1
			Integrated	2.5	NA	2.1	2.3	2.0	1.9	1.7	2.2	1.9	2.0	2.1	1.8
	Medium	18.5	Integrated	1.0	NA	1.8	1.9	1.8	1.7	1.6	1.8	1.7	1.8	1.8	1.6
	Large	30.9	Commission	3.8	NA	2.9	3.3	2.6	2.2	1.5	2.8	2.1	2.4	2.5	1.8
			Integrated	2.9	NA	2.7	2.8	2.7	2.6	2.5	2.7	2.6	2.6	2.6	2.5
c. Hosiery products	Small	2.5	Own hosiery	0.8	-0.9	-1.2	0.0	-1.4	NA	-2.8	-0.4	-1.7	-1.1	NA	-1.9
			Integrated	3.0	2.5	2.5	2.7	2.4	NA	2.1	2.7	2.4	2.5	NA	2.3
	Medium	5.5	Own hosiery	2.0	1.6	1.6	1.8	1.6	NA	1.2	1.7	1.5	1.6	NA	1.5
6. Carpet finishing	Small	20.2	Integrated	2.4	NA	2.1	2.2	2.0	2.0	1.8	2.1	1.9	2.0	2.1	1.9
	Medium	48.6	Integrated	2.1	NA	1.9	2.0	1.8	1.8	1.7	1.9	1.8	1.8	1.8	1.7
	Large	121.5	Integrated	2.7	NA	2.5	2.6	2.4	2.3	2.1	2.4	2.3	2.3	2.4	2.2
7. Stock & yarn finishing	Small	9.8	Commission	2.1	NA	-1.3	0.5	-2.2	-3.1	-6.1	-0.6	-3.6	-2.1	-1.5	-4.5
			Own yarn	1.0	NA	0.6	0.8	0.5	0.4	0.1	0.6	0.4	0.5	0.6	0.3
			Integrated	2.0	NA	1.1	1.5	0.9	0.7	-0.1	1.3	0.6	1.0	1.1	0.4
	Medium	23.5	Own yarn	2.3	NA	1.8	2.0	1.7	1.5	1.2	1.8	1.4	1.6	1.7	1.3
			Integrated	2.2	NA	1.8	2.0	1.7	1.6	1.3	1.8	1.5	1.7	1.7	1.4
	Large	39.1	Own yarn	2.3	NA	1.9	2.1	1.8	1.6	1.4	1.9	1.6	1.7	1.8	1.5
			Integrated	2.6	NA	2.4	2.5	2.3	2.2	2.1	2.4	2.2	2.3	2.3	2.1
	X-Large	58.6	Integrated	2.6	NA	2.4	2.5	2.4	2.3	2.1	2.4	2.2	2.3	2.3	2.2
8. Nonwoven manufacturing	Small	10.4	N.A.	2.6	1.9	1.9	2.2	1.8	1.4	1.0	2.1	1.7	1.9	2.0	1.6
	Medium	23.6	N.A.	2.3	2.0	2.0	2.1	2.0	1.9	1.7	2.1	1.9	2.0	2.0	1.8
9. Felted fabric processing	Small	0.9	N.A.	5.3	4.3	4.2	NA	4.1	NA	3.4	4.6	3.9	4.2	NA	3.8
	Medium	2.0	N.A.	2.6	1.7	1.7	NA	1.5	NA	0.0	2.0	1.3	1.7	NA	1.2

1/ Treatment alternatives M, N and P are applicable to wool scouring only.

Table VIII- 3. The textile industry, representative model plant impacts, percentage reductions in model's income due to wastewater control expenditures - direct dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (BAT) -- existing sources A	B	C	D	E	F	G	H	I	J	K
		(kkg)		(percent)										
									(M	N	P) 1/			
1. Wool scouring	Small	16.2	Commission	NA	NA	76.8	201.2	NA	202.2	318.2	244.9	NA	NA	NA
	Medium	35.6	Commission	NA	NA	310.4	938.8	NA	918.4	1823.7	1172.7	NA	NA	NA
	Large	81.0	Commission	NA	NA	21.5	18.7	NA	76.9	139.7	106.5	NA	NA	NA
2. Wool finishing	Small	7.4	Integrated	NA	30.9	NA	38.9	NA	73.5	29.8	52.7	42.1	NA	61.6
	Medium	18.6	Integrated	NA	30.4	NA	39.6	NA	60.1	35.7	62.8	49.8	NA	74.3
	Large	37.3	Integrated	NA	5.2	NA	6.8	NA	15.8	6.9	11.4	6.0	NA	12.9
3. (Omitted)														
4. Woven fabric finishing a. Simple processing	Small	5.4	Commission	NA	273.7	122.6	316.4	510.0	701.8	186.2	382.3	279.5	230.7	424.5
			Own fabric	NA	146.2	61.5	171.9	290.0	406.9	94.0	212.1	149.6	119.9	237.8
			Integrated	NA	23.9	12.1	27.3	42.3	57.6	17.1	32.4	24.4	20.6	35.8
	Medium	29.6	Commission	NA	44.4	24.0	57.9	76.7	120.9	43.2	83.0	63.1	58.1	99.4
			Own fabric	NA	19.0	10.4	23.9	29.8	43.2	18.4	32.4	26.0	23.8	37.3
			Integrated	NA	6.7	3.7	8.5	10.5	15.3	6.5	11.5	9.2	8.4	13.2
	Large	73.9	Commission	NA	14.0	7.5	18.2	26.3	37.0	16.5	27.7	22.8	21.3	32.0
			Integrated	NA	4.1	2.2	5.3	7.7	10.8	4.8	8.1	6.7	6.2	9.4
b. Complex processing	Small	23.3	Commission	NA	57.8	30.7	76.6	102.7	164.4	56.4	112.0	84.1	77.5	135.3
			Integrated	NA	8.1	4.5	10.2	12.7	18.4	7.8	13.8	11.1	10.2	15.2
	Medium	116.3	Commission	NA	23.7	12.2	31.0	50.4	77.3	31.6	52.5	27.3	40.4	61.2
			Own fabric	NA	8.0	4.1	10.5	16.8	24.4	10.7	17.5	9.2	13.7	20.0
			Integrated	NA	4.4	2.3	5.8	9.2	13.4	5.9	9.6	5.1	7.5	11.0
	Large	193.8	Integrated	NA	3.1	1.5	4.0	7.0	9.5	4.4	7.1	3.2	5.5	8.1
c. Desizing	Small	21.4	Commission	NA	57.6	30.8	75.9	101.4	162.4	56.2	109.9	82.9	76.8	132.9
			Own fabric	NA	26.1	14.6	33.0	41.2	60.0	25.4	44.6	35.9	33.1	51.4
			Integrated	NA	8.6	4.8	10.8	13.5	19.5	8.3	14.6	11.8	10.8	16.9
	Medium	53.6	Commission	NA	17.5	7.6	18.1	26.4	36.9	16.4	27.6	22.8	21.4	31.9
			Own fabric	NA	12.6	5.5	13.0	18.9	26.4	11.8	19.8	16.3	15.3	22.8
			Integrated	NA	7.1	3.1	7.4	10.7	15.0	6.7	11.2	9.2	8.7	12.9
	Large	178.5	Own fabric	NA	7.5	3.6	9.9	17.1	23.4	10.8	17.5	8.0	13.5	19.8
			Integrated	NA	5.8	2.7	7.5	13.0	17.8	8.3	13.4	6.1	10.3	15.1
5. Knit fabric finishing a. Simple processing	Small	8.0	Commission	NA	84.8	41.3	107.0	133.2	217.2	67.8	144.1	103.3	90.5	170.3
			Integrated	NA	16.1	8.5	19.3	22.7	33.5	13.3	24.3	18.9	16.8	27.6
	Medium	32.2	Commission	NA	24.6	13.5	31.7	42.9	63.3	26.9	46.0	37.2	34.8	53.8
			Integrated	NA	5.1	2.8	6.6	8.9	12.6	5.6	9.5	7.7	7.2	11.0
	Large	160.8	Commission	NA	12.6	5.9	16.5	28.5	39.0	18.1	29.2	13.3	22.6	33.1
			Integrated	NA	2.9	1.4	3.8	6.6	9.0	4.2	6.7	3.1	5.2	7.6

Table VIII-3. (continued)

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (BAT) -- existing sources										
				A	B	C	D	E	F	G	H	I	J	K
		(kkg)		(percent)										
5. Knit fabric finishing (continued)														
b. Complex processing	Small	7.7	Commission	NA	87.9	43.2	111.1	138.8	225.1	70.2	149.8	107.2	94.4	176.9
			Integrated	NA	14.8	8.0	17.8	21.1	30.9	12.2	22.4	17.4	15.6	25.5
	Medium	18.5	Integrated	NA	10.0	5.6	12.6	15.7	22.7	9.7	17.0	13.7	12.6	19.6
	Large	30.9	Commission	NA	24.1	13.5	31.0	42.2	61.7	26.4	45.0	36.4	34.3	52.6
			Integrated	NA	5.4	3.0	6.9	9.3	13.2	5.9	10.0	8.1	7.6	11.5
c. Hosiery products	Small	2.5	Own hosiery	211.6	245.1	103.0	269.0	NA	446.0	148.4	317.0	238.0	NA	341.1
			Integrated	13.9	15.8	7.6	17.2	NA	27.3	10.2	19.9	15.4	NA	21.3
	Medium	5.5	Own hosiery	16.5	17.0	8.6	19.4	NA	40.6	12.1	23.0	17.2	NA	25.4
6. Carpet finishing	Small	20.2	Integrated	NA	11.7	6.3	14.1	16.6	24.4	9.7	17.7	13.8	12.3	20.1
	Medium	48.6	Integrated	NA	8.2	4.6	10.4	13.0	18.8	8.0	14.1	11.3	10.4	16.2
	Large	121.5	Integrated	NA	7.5	4.1	9.8	14.3	20.0	8.9	15.0	12.3	11.6	17.3
7. Stock & yarn finishing	Small	9.8	Commission	NA	161.9	75.9	205.0	247.3	391.0	126.5	271.1	199.2	171.2	314.2
			Own yarn	NA	39.1	20.7	47.3	58.0	92.1	32.2	60.9	46.0	41.0	70.9
			Integrated	NA	43.1	22.3	53.2	66.7	104.0	35.2	69.2	51.3	45.8	80.6
	Medium	23.5	Own yarn	NA	21.7	11.9	27.3	34.0	49.3	21.0	36.9	29.7	27.2	42.6
			Integrated	NA	17.6	9.7	22.2	27.7	40.2	17.1	30.1	24.2	22.2	34.7
	Large	39.1	Own yarn	NA	16.3	8.9	20.8	28.1	40.0	17.7	30.1	24.5	22.9	34.9
			Integrated	NA	8.0	4.4	10.3	13.8	19.7	8.7	14.9	12.1	11.3	17.2
	X-Large	58.6	Integrated	NA	6.6	3.6	8.6	12.5	17.5	7.8	13.1	10.8	1.01	15.1
8. Nonwoven manufacturing	Small	10.4	N.A.	24.4	25.1	12.7	28.6	44.4	61.7	17.9	34.0	25.5	21.6	37.4
	Medium	23.6	N.A.	11.7	11.3	6.0	13.5	15.9	23.4	9.2	17.0	13.2	11.8	19.3
9. Felted fabric processing	Small	0.9	N.A.	18.7	21.2	NA	23.1	NA	36.7	13.7	26.8	20.7	NA	28.6
	Medium	2.0	N.A.	35.0	36.0	NA	41.4	NA	98.4	25.5	49.9	36.6	NA	55.6

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

shown for all control alternatives when applied to the small and medium sized plants. Large plants have profits reduced to negative levels under treatment alternative of G and H. The impacts of treatment alternatives C, D, and F result in profit reductions but not to negative levels.

The returns of the small commission models in all of the remaining subcategories show significant reductions in profitability from the cost of controls incurring negative returns under most of the alternatives. The returns of small models in woven fabric (simple) and show reductions in excess of 100 percent for virtually all of the alternatives. In addition to the severe impacts on the commission models, negative returns are also shown under all alternatives for own fabric models in two subcategories: woven fabric (simple) and hosiery products. The reduction in returns for most of the large models in all subcategories are relatively minor, varying between 5 and 20 percent.

b. Return on Total Assets

The 21-year average after-tax returns on total assets before and after BAT expenditures are shown in Table VIII-4. The absolute values of the returns under baseline are generally four and five times greater than the corresponding returns on sales discussed above, because of the smaller bases associated with the assets (total assets vary from about 20 to 50 percent of sales). The negative values under the alternatives follow the same pattern as those for returns on sales. Negative returns are shown for both the small and medium models in wool scouring and for the small commission models in the other subcategories. The largest negative returns are indicated for the small commission models in wool scouring and woven fabric (simple) and the small own hosiery models.

The reductions in the returns on assets of the large models are relatively small. For example, the return on assets of the large integrated woven fabric (desizing) model is reduced from 13.6 percent under baseline to 10.7 percent under Alternative F, the most stringent alternative. This amounts to a reduction of about 20 percent. The large integrated knit fabric (simple) model has its return reduced from 11.9 percent under baseline to 10.7 percent under Alternative F for about a 10 percent reduction.

c. Annual Cash Flows

Annual cash flows represent those occurring in the year 21 and were calculated by adding after-tax profits and depreciation. Cash flows represent the inflow of dollars to operations; consequently, they indicate the ability of the models to maintain operations. If the flows are positive, the model can continue to operate in the short-run even though the net income may be negative (loss). The annual cash flows for existing models subject to BAT controls are contained in Table VIII-5.

The small wool scouring model has a negative cash flow of $87,000 under baseline which indicates its difficulty in maintaining operations even without controls. Under the cost of controls, the negative cash flows became significantly larger. Cash flows became negative under most of the alternatives for two other small models: the commission woven fabric

Table VIII- 4. The textile industry, representative existing model plant impacts, effects of wastewater control expenditures on average after-tax returns on total assets - direct dischargers.

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (BAT) -- existing sources A	B	C	D	E	F	G	H	I	J	K
		(kkg)								(M	N	P)1/			
1. Wool scouring	Small	16.2	Commission	-12.0	NA	NA	-21.0	-34.4	NA	-34.4	-45.5	-38.1			
	Medium	35.6	Commission	1.2	NA	NA	-1.8	-8.0	NA	-7.8	-16.4	-10.1			
	Large	81.0	Commission	4.7	NA	NA	3.7	1.2	NA	1.3	-1.0	0.1			
2. Wool finishing	Small	7.4	Integrated	8.6	NA	5.8	NA	5.0	NA	2.1	5.8	3.8	4.8	NA	3.1
	Medium	18.6	Integrated	9.4	NA	6.5	NA	5.7	NA	4.0	6.0	3.7	4.9	NA	2.8
	Large	37.3	Integrated	14.7	NA	13.9	NA	13.6	NA	12.0	13.5	12.8	13.6	NA	12.5
3. (Omitted)															
4. Woven fabric finishing															
a. Simple processing	Small	5.4	Commission	9.0	NA	-13.9	-1.6	-16.4	-32.9	-44.4	-6.9	-21.1	-14.1	-9.9	-23.1
			Own fabric	5.2	NA	-2.5	2.0	-3.7	-10.1	-15.6	0.3	-5.7	-2.6	-1.0	-6.9
			Integrated	9.8	NA	7.3	8.5	6.9	5.4	3.9	8.0	6.4	7.2	7.6	6.0
	Medium	29.6	Commission	7.6	NA	4.1	5.7	3.1	1.9	-0.8	4.2	1.5	2.8	3.1	0.4
			Own fabric	6.9	NA	5.5	6.1	5.1	4.6	3.6	5.5	4.5	5.0	5.1	4.1
			Integrated	11.1	NA	10.3	10.6	10.0	9.7	9.1	10.2	9.6	10.0	10.0	9.4
	Large	73.9	Commission	14.6	NA	12.4	13.3	11.6	10.1	8.6	11.8	10.1	11.1	11.0	9.4
			Integrated	15.8	NA	15.1	15.4	14.8	14.2	13.7	14.9	14.3	14.7	14.6	14.0
b. Complex processing	Small	23.3	Commission	7.7	NA	3.2	5.2	1.9	0.3	-3.4	3.3	-0.4	1.4	1.9	-1.9
			Integrated	10.4	NA	9.5	9.9	9.2	8.8	8.2	9.5	8.8	9.2	9.2	8.6
	Medium	116.3	Commission	7.4	NA	5.5	6.4	5.0	3.5	1.8	4.9	3.4	5.2	4.2	2.8
			Own fabric	9.8	NA	9.0	9.4	8.7	7.9	7.2	8.6	7.9	8.7	8.3	7.6
			Integrated	11.7	NA	11.2	11.4	11.0	10.4	9.9	10.9	10.4	11.0	10.7	10.2
	Large	193.8	Integrated	11.7	NA	11.3	11.5	11.2	10.7	10.4	11.1	10.8	11.3	11.0	10.6
c. Desizing	Small	21.4	Commission	11.3	NA	4.6	7.5	2.8	0.6	-4.5	4.7	-0.4	2.1	2.7	-2.4
			Own fabric	7.0	NA	5.0	5.8	4.5	3.8	2.5	5.0	3.6	4.3	4.4	3.1
			Integrated	12.4	NA	11.2	11.7	10.9	10.4	9.6	11.2	10.4	10.9	10.9	10.0
	Medium	53.6	Commission	19.1	NA	14.9	17.3	15.1	12.9	10.9	15.3	13.0	14.5	14.2	12.1
			Own fabric	11.3	NA	9.6	10.6	9.6	8.8	7.9	9.7	8.8	9.3	9.3	8.4
			Integrated	15.8	NA	14.4	15.2	14.4	13.7	12.9	14.5	13.7	14.2	14.1	13.4
	Large	178.5	Own fabric	9.2	NA	8.4	8.8	8.2	7.4	6.8	8.1	7.4	8.3	7.8	7.2
			Integrated	13.6	NA	12.7	13.1	12.4	11.4	10.7	12.2	11.5	12.5	11.9	11.2
5. Knit fabric finishing															
a. Simple processing	Small	8.0	Commission	8.8	NA	1.6	5.0	0.0	-1.4	-6.8	2.9	-2.8	0.2	1.2	-4.6
			Integrated	10.7	NA	8.8	9.6	8.4	7.7	6.5	9.1	7.8	8.5	8.6	7.4
	Medium	32.2	Commission	16.1	NA	11.8	13.6	10.4	8.2	5.4	11.1	8.0	9.8	9.7	6.8
			Integrated	12.0	NA	11.3	11.6	11.1	10.7	10.2	11.2	10.6	11.0	10.9	10.4

continued...

Table VIII-4. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternatives (BAT) -- existing sources										
					A	B	C	D	E	F	G	H	I	J	K
5. Knit fabric finishing (continued)															
a. Simple processing	Large	160.8	Commission	15.8	NA	13.6	14.7	12.9	10.6	9.0	12.5	10.7	13.2	11.7	10.0
			Integrated	11.9	NA	11.5	11.7	11.4	11.0	10.7	11.3	11.0	11.5	11.2	10.9
b. Complex processing	Small	7.7	Commission	8.8	NA	1.4	4.9	-0.3	-1.7	-7.3	2.7	-3.3	-0.1	0.9	-5.1
			Integrated	10.1	NA	8.5	9.2	8.1	7.5	6.5	8.7	7.6	8.2	8.3	7.2
	Medium	18.5	Integrated	8.0	NA	7.2	7.5	6.9	6.6	6.0	7.2	6.5	6.9	6.9	6.3
	Large	30.9	Commission	16.2	NA	11.9	13.7	10.6	8.4	5.6	11.3	8.2	10.0	9.9	7.0
			Integrated	11.3	NA	10.6	10.9	10.4	10.0	9.5	10.5	10.0	10.3	10.2	9.7
c. Hosiery products	Small	2.5	Own hosiery	9.2	-9.4	-12.9	-0.4	-14.4	NA	-28.5	-4.6	-18.3	-11.8	NA	-19.7
			Integrated	9.2	7.8	7.7	8.5	7.5	NA	6.6	8.2	7.2	7.7	NA	7.1
	Medium	5.5	Own hosiery	9.2	7.5	7.4	8.3	7.2	NA	5.1	7.9	6.8	7.4	NA	6.6
6. Carpet finishing	Small	20.2	Integrated	9.7	NA	8.5	9.0	8.2	7.7	6.9	8.7	7.8	8.3	8.3	7.5
	Medium	48.6	Integrated	14.7	NA	13.4	13.9	12.9	12.3	11.4	13.3	12.3	12.9	12.9	11.9
	Large	121.5	Integrated	11.0	NA	10.0	10.4	9.7	9.1	8.4	9.8	9.1	9.5	9.5	8.8
7. Stock & yarn finishing	Small	9.8	Commission	10.9	NA	-4.6	3.3	-8.0	-8.4	-17.5	-1.2	-13.4	-8.2	-4.8	-16.1
			Own yarn	6.4	NA	3.7	5.0	3.2	2.5	0.6	4.2	2.3	3.3	3.6	1.7
			Integrated	11.5	NA	6.3	8.6	5.2	3.7	0.5	7.1	3.5	5.5	5.9	2.4
	Medium	23.5	Own yarn	9.0	NA	6.9	7.8	6.3	5.5	4.2	6.9	5.4	6.1	6.2	4.8
			Integrated	10.6	NA	8.5	9.4	8.0	7.2	5.8	8.5	7.1	7.9	7.9	6.5
	Large	39.1	Own yarn	8.9	NA	7.3	8.0	6.8	6.1	5.0	7.1	6.0	6.6	6.6	5.5
			Integrated	10.0	NA	9.2	9.5	8.9	8.4	7.8	9.1	8.4	8.8	8.8	8.1
	X-Large	58.6	Integrated	10.0	NA	9.3	9.6	9.1	8.6	8.0	9.1	8.6	8.9	8.9	8.3
8. Nonwoven manufacturing	Small	10.4	N.A.	14.4	10.5	10.5	12.3	9.9	7.7	5.3	11.6	9.1	10.4	10.9	8.5
	Medium	23.6	N.A.	7.3	6.4	6.4	6.8	6.2	6.0	5.4	6.6	6.0	6.3	6.4	5.8
9. Felted fabric processing	Small	0.9	N.A.	13.0	10.2	10.0	NA	9.7	NA	7.8	11.0	9.2	10.0	NA	8.9
	Medium	2.0	N.A.	6.6	4.2	4.2	NA	3.8	NA	0.4	4.9	3.2	4.1	NA	2.9

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Table VIII- 5. The textile industry, representative existing model impacts, effects of wastewater control expenditures on annual cash flow (year 21) - direct dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (BAT) -- existing sources										
					A	B	C	D	E	F	G	H	I	J	K
		(kkg)			($1,000)										
										(M	N	P)1/			
1. Wool scouring	Small	16.2	Commission	-87	NA	NA	-249	-514	NA	-515	-763	-601	NA	NA	NA
	Medium	35.6	Commission	356	NA	NA	231	-127	NA	-116	-638	-248	NA	NA	NA
	Large	81.0	Commission	1,438	NA	NA	1,320	1,034	NA	1,038	882	928	NA	NA	NA
2. Wool finishing	Small	7.4	Integrated	1,714	NA	1,397	NA	1,332	NA	1,090	1,427	1,200	1,265	NA	1,134
	Medium	18.6	Integrated	2,865	NA	2,378	NA	2,259	NA	1,813	2,337	1,952	2,030	NA	1,832
	Large	37.3	Integrated	19,248	NA	18,515	NA	18,336	NA	17,189	18,340	17,721	18,569	NA	17,541
3. (Omitted)															
4. Woven fabric finishing															
a. Simple processing	Small	5.4	Commission	182	NA	-118	68	-157	-426	-651	-8	-237	-119	-49	-276
			Own fabric	330	NA	87	232	47	-221	-446	186	-33	85	154	-72
			Integrated	1,267	NA	1,068	1,169	1,047	901	780	1,127	1,003	1,067	1,105	983
	Medium	29.6	Commission	1,319	NA	1,005	1,156	938	914	697	1,031	808	869	959	741
			Own fabric	2,793	NA	2,479	2,630	2,412	2,388	2,171	2,505	2,282	2,343	2,433	2,215
			Integrated	7,566	NA	7,252	7,404	7.186	7,161	6,944	7,279	7,055	7,117	7,206	6,989
	Large	73.9	Commission	5,484	NA	5,000	5,245	4,880	4,702	4,337	4,957	4,574	4,650	4,819	4,454
			Integrated	16,317	NA	15,833	16,078	15,713	15,535	15,170	15,790	15,407	15,483	15,652	15,287
b. Complex processing	Small	23.3	Commission	1,042	NA	728	876	661	634	418	754	531	592	618	464
			Integrated	6,381	NA	6,067	6,216	6,001	5,974	5,760	6,094	5,870	5,932	6,018	5,804
	Medium	116.3	Commission	5,824	NA	5,087	5,482	4,904	4,463	3,758	4,917	4,294	5,146	4,689	4,111
			Own fabric	14,732	NA	13,995	14,390	13,813	13,371	12,667	13,825	13,202	14,054	13,597	13,020
			Integrated	24,522	NA	23,784	24,179	23,602	23,161	22,456	23,615	22,991	23,843	23,386	22,809
	Large	193.8	Integrated	50,036	NA	48,986	49,589	48,723	47,909	47,043	48,629	47,708	49,098	48,310	47,444
c. Desizing	Small	21.4	Commission	926	NA	612	760	545	518	293	638	415	477	563	348
			Own fabric	2,014	NA	1,700	1,849	1,634	1,607	1,392	1,727	1,503	1,565	1,651	1,437
			Integrated	5,773	NA	5,458	5,607	5,392	5,365	5,150	5,485	5,261	5,323	5,410	5,195
	Medium	53.6	Commission	5,196	NA	4,676	4,951	4,592	4,409	4,048	4,669	4,286	4,362	4,525	4,166
			Own fabric	7,663	NA	7,143	7,418	7,059	6,876	6,515	7,136	6,753	6,829	6,992	6,633
			Integrated	11,808	NA	11,288	11,564	11,204	11,021	10,661	11,281	10,898	10,974	11,137	10,778
	Large	178.5	Own fabric	22,761	NA	21,711	22,313	21,447	20,633	19,767	21,354	20,432	21,822	21,035	20,169
			Integrated	25,995	NA	24,945	25,548	24,682	23,868	23,002	24,588	23,667	25,057	24,269	23,403
5. Knit fabric finishing															
a. Simple processing	Small	8.0	Commission	559	NA	327	442	291	316	110	375	214	281	336	153
			Integrated	2,259	NA	2,027	2,142	1,991	2,016	1,865	2,076	1,921	1,982	2,036	1,885
	Medium	32.2	Commission	2,405	NA	2,015	2,205	1,923	1,829	1,546	2,009	1,716	1,785	1,906	1,623
			Integrated	11,266	NA	10,876	11,066	10,784	10,690	10,407	10,870	10,577	10,646	10,767	10,484
	Large	160.8	Commission	12,737	NA	11,687	12,294	11,424	10,613	9,744	11,330	10,409	11,799	11,016	10,145
			Integrated	53,177	NA	52,127	52,734	51,863	51,053	50,183	51,770	50,848	52,239	51,455	50,585

continued...

Table VIII-5. (continued)

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (BAT) -- existing sources										
					A	B	C	D	E	F	G	H	I	J	K
		(kkg)			($1,000)										
5. Knit fabric finishing (continued)															
b. Complex processing	Small	7.7	Commission	543	NA	311	425	275	298	84	359	193	266	318	128
			Integrated	2,476	NA	2,244	2,358	2,208	2,232	2,082	2,293	2,138	2,199	2,252	2,102
	Medium	18.5	Integrated	5,492	NA	5,178	5,327	5,112	5,085	4,870	5,205	4,981	5,043	5,130	4,915
	Large	30.9	Commission	2,457	NA	2,067	2,253	1,975	1,877	1,598	2,061	1,768	1,837	1,954	1,675
			Integrated	10,884	NA	10,494	10,681	10,402	10,304	10,026	10,488	10,195	10,264	10,381	10,102
c. Hosiery products	Small	2.5	Own hosiery	165	-58	-115	61	-137	NA	-363	4	-198	-95	NA	-220
			Integrated	1,957	1,805	1,774	1,870	1,763	NA	1,641	1,838	1,730	1,785	NA	1,718
	Medium	5.5	Own hosiery	1,592	1,409	1,392	1,493	1,371	NA	1,105	1,452	1,328	1,392	NA	1,308
6. Carpet finishing	Small	20.2	Integrated	3,059	NA	2,827	2,941	2,791	2,815	2,665	2,876	2,722	2,782	2,835	2,685
	Medium	48.6	Integrated	5,621	NA	5,307	5,455	5,240	5,213	4,999	5,333	5,110	5,172	5,358	5,043
	Large	121.5	Integrated	9,270	NA	8,786	9,025	8,665	8,482	8,122	8,742	8,360	8,435	8,599	8,239
7. Stock & yarn finishing	Small	9.8	Commission	355	NA	104	238	36	77	-206	171	-94	20	117	-162
			Own yarn	1,052	NA	820	935	783	809	657	868	714	774	829	678
			Integrated	901	NA	669	784	633	658	506	717	563	624	678	527
	Medium	23.5	Own yarn	2,407	NA	2,092	2,244	2,026	2,002	1,784	2,119	1,895	1,957	2,047	1,829
			Integrated	2,282	NA	1,968	2,119	1,902	1,877	1,660	1,995	1,771	1,833	1,922	1,704
	Large	39.1	Own yarn	4,029	NA	3,638	3,829	3,547	3,453	3,170	3,633	3,340	3,409	3,530	3,247
			Integrated	7,862	NA	7,471	7,662	7,380	7,286	7,003	7,466	7,173	7,242	7,363	7,080
	X-Large	58.6	Integrated	11,741	NA	11,257	11,502	11,136	10,959	10,593	11,213	10,831	10,906	11,075	10,710
8. Nonwoven manufacturing	Small	10.4	N.A.	1,209	1,026	1,009	1,111	988	844	722	1,069	945	1,009	1,047	925
	Medium	23.6	N.A.	3,102	2,873	2,868	2,984	2,833	2,858	2,707	2,919	2,763	2,825	2,878	2,727
9. Felted fabric processing	Small	0.9	N.A.	1,194	1,042	1,012	NA	1,000	NA	878	1,075	967	1,022	NA	956
	Medium	2.0	N.A.	1,039	856	838	NA	818	NA	552	898	774	839	NA	755

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

(simple) and own hosiery models. The cash flows for the small commission yarn model exceed $100,000 for both Alternative B (Option 3) and C (Option 2); however under the three most stringent alternatives the flows turn negative. The cash flows for the small carpet model exceed $2 million under all alternatives.

The largest integrated models in woven and knit fabric have baseline cash flows of about $50 million. The reductions of these cash flows under Alternative F are less than 10 percent. The baseline cash flows of the large commission models are about one-fifth the size of the large integrated models in the corresponding subcategories. Under the cost of the controls, the flows of these commission models are reduced significantly; however, they remain at levels greater than a million dollars.

d. Net Present Value

The NPV's for the direct discharger models are shown in Table VIII-6, both under baseline and BAT controls. Negative values are shown under baseline for all of the wool scouring models and for two other models: the small own fabric woven (simple), and the small own yarn. Under BAT controls, NPV's are negative not only for these models but also for the small commission models in all of the subcategories. In addition, negative values are shown for the small wool finishing model. Three models--the small own fabric woven (desizing); the small integrated yarn; and the medium felted fabric--have negative NPV's under Alternative F but positive under all others. The NPV's of the remaining models are relatively large, generally indicating the viability of the models when subjected to costs of control.

3. Production Effects

As discussed in the previous chapter, it is estimated that there are 198 direct discharge wet processors (excluding water jet weaving mills) currently existing in the industry. Thirty-four of these are assumed to be meeting BAT limitations and do not require any additional controls. The remaining 164 plants can be expected to require the controls. Estimated closures, both under baseline and under controls, are discussed below.

a. Baseline Plant Closures

Baseline closures were estimated from an analysis of industry trends (as described in the Census of Manufactures) and the economic survey (conducted in conjunction with this study). Within the horizon of this study (10 years) it is estimated that about 10 percent of the existing direct dischargers requiring controls will close under baseline conditions.

These closures are listed in Table VIII-7 and include two in wool scouring, two in wool finishing, fifteen in woven fabric, four in knit fabric, one in hosiery and three in stock and yarn. Consequently, the number of plants to be considered in this subsequent analysis as requiring controls and subject to impact is reduced from 164 to 149.

Table VIII- 6. The textile industry, representative existing model plant impacts, effects of wastewater control expenditures on net present values - direct dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (BAT) -- existing sources A	B	C	D	E	F	G	H	I	J	K
		(kkg)		($1,000)											
										(M	N	P)1/			
1. Wool scouring	Small	16.2	Commission	-1,095	NA	NA	-1,661	-2,582	NA	-2,588	-3,448	-2,897	NA	NA	NA
	Medium	35.6	Commission	-1,190	NA	NA	-1,728	-2,744	NA	-2,712	-4,182	-3,112	NA	NA	NA
	Large	81.0	Commission	-1,237	NA	NA	-1,664	-2,656	NA	-2,635	-3,355	-3,047	NA	NA	NA
2. Wool finishing	Small	7.4	Integrated	503	NA	-602	NA	-861	NA	-1,840	-532	-1,334	-1,032	NA	-1,593
	Medium	18.6	Integrated	3,525	NA	1,832	NA	1,368	NA	54	1,612	258	697	NA	-207
	Large	37.3	Integrated	39,581	NA	37,035	NA	36,333	NA	32,119	36,299	34,135	36,925	NA	33,430
3. (Omitted)															
4. Woven fabric finishing a. Simple processing	Small	5.4	Commission	339	NA	-506	-85	-614	-1,176	-1,700	-262	-797	-518	-374	-904
			Own fabric	-62	NA	-804	-433	-898	-1,394	-1,854	-589	-1,058	-814	-687	-1,151
			Integrated	2,005	NA	1,313	1,660	1,228	759	333	1,514	1,079	1,305	1,426	994
	Medium	29.6	Commission	1,026	NA	-71	440	-330	-544	-1,312	-9	-802	-510	-293	-1,062
			Own fabric	2,408	NA	1,311	1,823	1,052	838	70	1,373	580	872	1,089	320
			Integrated	9,503	NA	8,407	8,918	8,148	7,934	7,166	8,469	7,675	7,968	8,185	7,416
	Large	73.9	Commission	10,768	NA	9,084	9,898	8,617	7,815	6,532	8,855	7,511	7,940	8,324	7,044
			Integrated	21,553	NA	19,869	20,683	19,403	18,600	17,317	19,640	18,297	18,725	19,109	17,829
b. Complex processing	Small	23.3	Commission	693	NA	-404	98	-663	-886	-1,643	-342	-1,135	-842	-637	1,394
			Integrated	7,061	NA	5,965	6,467	5,705	5,483	4,726	6,027	5,233	5,526	5,731	4,974
	Medium	116.3	Commission	3,157	NA	599	1,904	-115	-1,888	-4,325	-125	-2,302	501	-997	-3,015
			Own fabric	17,183	NA	14,625	15,930	13,911	12,138	9,701	13,902	11,725	14,527	13,029	11,011
			Integrated	20,369	NA	27,811	29,115	27,097	25,323	22,886	27,087	24,910	27,713	26,215	24,197
	Large	193.8	Integrated	52,781	NA	49,134	51,136	48,110	44,943	41,918	47,715	44,500	49,221	46,501	43,476
c. Desizing	Small	21.4	Commission	723	NA	-374	128	-633	-856	-1,615	-312	-1,105	-813	-606	-1,366
			Own fabric	1,688	NA	591	1,093	332	109	-649	653	-140	153	360	-400
			Integrated	7,702	NA	6,606	7,108	6,347	6,124	5,365	6,668	5,874	6.167	6,374	5,614
	Medium	53.6	Commission	12,658	NA	10,688	11,769	10,507	9,686	8,422	10,744	9,401	9,829	10,194	8,933
			Own fabric	11,632	NA	9,662	10,744	9,481	8,660	7,396	9,718	8,375	8,804	9,169	7,908
			Integrated	17,878	NA	15,908	16,990	15,727	14,906	13,642	15,964	14,621	15,050	15,415	14,154
	Large	178.5	Own fabric	20,687	NA	17,040	19,043	16,017	12,849	9,824	15,621	12,407	17,127	14,408	11,383
			Integrated	28,450	NA	24,803	26,806	23,780	20,613	17,588	23,384	20,170	24,890	22,171	19,146
5. Knit fabric finishing a. Simple processing	Small	8.0	Commission	772	NA	-55	343	-206	-265	-814	101	-459	-207	-63	-610
			Integrated	3,881	NA	3,073	3,463	2,927	2,883	2,347	3,227	2,680	2,923	3,069	2,534
	Medium	32.2	Commission	4,396	NA	3,035	3,673	2,678	2,206	1,211	2,960	1,924	2,286	2,561	1,563
			Integrated	16,485	NA	15,125	15,763	14,767	14,296	13,300	15,049	14,013	14,376	14,650	13,652

continued . . .

Table VIII-6. (continued)

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (BAT) -- existing sources										
					A	B	C	D	E	F	G	H	I	J	K
		(kkg)		($1,000)											
5. Knit fabric finishing															
a. Simple processing (cont'd)															
	Large	160.8	Commission	21,615	NA	17,968	19,984	16,944	13,789	10,752	16,549	13,334	18,055	15,349	12,310
			Integrated	58,979	NA	55,332	57,348	54,308	51,153	48,116	53,913	50,698	55,419	52,713	49,674
b. Complex processing	Small	7.7	Commission	753	NA	-74	319	-225	-288	-832	83	-477	-225	-86	-628
			Integrated	3,982	NA	3,173	3,558	3,027	2,978	2,447	3,328	2,780	3,024	3,164	2,635
	Medium	18.5	Integrated	5,238	NA	4,142	4,644	3,883	3,660	2,901	4,204	3,410	3,703	3,910	3,150
	Large	30.9	Commission	4,319	NA	2,958	3,583	2,601	2,116	1,134	2,883	1,847	2,209	2,470	1,486
			Integrated	10,157	NA	8,797	9,422	8,439	7,955	6,972	8,721	7,685	8,047	8,308	7,324
c. Hosiery products	Small	2.5	Own hosiery	143	-518	-624	-225	-684	NA	-1,183	-355	-819	-595	NA	-880
			Integrated	1,646	1,106	1,015	1,343	967	NA	554	1,236	855	1,041	NA	807
	Medium	5.5	Own hosiery	1,531	876	837	1,183	751	NA	-143	1,041	602	831	NA	519
6. Carpet finishing	Small	20.2	Integrated	5,956	NA	5,147	5,532	5,001	4,952	4,421	5,302	4,755	4,998	5,138	4,609
	Medium	48.6	Integrated	13,602	NA	12,506	13,007	12,246	12,022	11,265	12,567	11,774	12,067	12,274	11,514
	Large	121.5	Integrated	21,266	NA	19,582	20,378	19,115	18,295	17,030	19,353	18,009	18,438	18,803	17,542
7. Stock & yarn finishing	Small	9.8	Commission	470	NA	-451	-10	-624	-719	-1,333	-279	-906	-617	-468	-1,078
			Own yarn	-235	NA	-1,044	-654	-1,190	-1,233	-1,770	-889	-1,436	-1,193	-1,048	-1,582
			Integrated	1,505	NA	696	1,087	550	507	-30	851	304	547	692	158
	Medium	23.5	Own yarn	2,929	NA	1,832	2,343	1,573	1,359	591	1,894	1,101	1,393	1,610	841
			Integrated	4,292	NA	3,195	3,707	2,936	2,722	1,955	3,257	2,464	2,757	2,974	2,205
	Large	39.1	Own yarn	4,806	NA	3,436	4,083	3,088	2,616	1,621	3,369	2,334	2,696	2,970	1,972
			Integrated	11,051	NA	9,682	10,329	9,333	8,862	7,866	9,615	8,579	8,941	9,216	8,218
	X-Large	58.6	Integrated	16,435	NA	14,751	15,565	14,284	13,482	12,199	14,522	13,178	13,607	13,990	12,711
8. Nonwoven manufacturing	Small	10.4	N.A.	2,281	1,625	1,586	1,934	1,502	1,035	607	1,790	1,351	1,581	1,699	1,270
	Medium	23.6	N.A.	6,052	5,229	5,237	5,628	5,095	5,048	4,514	5,398	4,844	5,094	5,234	4,702
9. Felted fabric processing	Small	0.9	N.A.	2,279	1,739	1,648	NA	1,600	NA	1,187	1,869	1,488	1,674	NA	1,441
	Medium	2.0	N.A.	1,212	556	517	NA	432	NA	-462	721	283	512	NA	201

1/ Treatment alternatives M, N and P are applicable to wool scouring only.

Table VIII-7. The textile industry, number of plants requiring BAT controls after baseline closures -- direct dischargers

Subcategory	Size	Daily Capacity	Type Plant	Total Number of plants	Number of plants requiring controls (before baseline closures)	Baseline closures	Number of plants requiring controls (after baseline closures)
1. Wool scouring	small	16.2	commission	2	2	1	1
	medium	35.6	commission	2	2	1	1
	large	81.0	commission	2	1	-	1
2. Wool finishing	small	7.4	integrated	5	5	2	3
	medium	18.6	integrated	1	1	-	1
	large	37.3	integrated	2	2	-	2
3. (Omitted)							
4. Woven fabric finishing							
a. Simple processing	small	5.4	commission	2	1	1	1
			own fabric	4	2	3	-
			integrated	8	4	2	4
	medium	29.6	commission	4	3	-	3
			own fabric	1	1	1	-
			integrated	8	6	-	6
	large	73.9	commission	1	1	-	1
			integrated	7	5	-	5
b. Complex processing	small	23.3	commission	1	1	-	1
			integrated	4	4	-	4
	medium	116.3	commission	1	1	-	1
			own fabric	5	5	5	
			integrated	2	2	-	2
	large	193.8	integrated	1	1	-	1
c. Desizing	small	21.4	commission	3	3	1	2
			own fabric	5	4	2	3
			integrated	3	3	-	3
	medium	53.6	commission	1	1	-	1
			own fabric	6	3	-	3
			integrated	6	4	-	4
	large	178.5	own fabric	10	9	-	9
			integrated	2	2	-	2
5. Knit fabric finishing							
a. Simple processing	small	8.0	commission	2	2	1	1
			integrated	8	8	2	6
	medium	32.2	commission	2	2	-	2
			integrated	9	7	-	7
	large	160.8	commission	1	1	-	1
			integrated	2	2	-	2
b. Complex processing	small	7.7	commission	1	1	-	1
			integrated	5	4	1	4
	medium	18.5	integrated	6	5	-	5
	large	30.9	commission	1	1	-	1
			integrated	2	1	-	1
c. Hosiery products	small	2.5	own hosiery	1	1	-	1
			integrated	5	5	1	4
	medium	5.5	own hosiery	1	1	-	1

Table VIII - 7. Continued

Subcategory	Size	Daily Capacity	Type Plant	Total Number of plants	Number of plants requiring controls (before baseline closures)	Baseline closures	Number of plants requiring controls (after baseline closures)
6. Carpet finishing	small	20.2	integrated	6	3	-	3
	medium	48.6	integrated	3	3	-	3
	large	121.5	integrated	2	-	-	-
7. Stock & yarn finishing	small	9.8	commission	2	2	-	2
			own yarn	3	3	2	1
			integrated	15	13	1	13
	medium	23.5	own yarn	3	3	-	3
			integrated	3	2	-	2
	large	39.1	own yarn	2	2	-	2
			integrated	4	3	-	3
	X-large	58.8	integrated	4	4	-	4
8. Nonwoven manufacturing	small	10.4	NA	3	3	-	3
	medium	23.6	NA	2	2	-	2
9. Felted fabric processing	small	0.9	NA	-	-	-	-
	medium	2.0	NA	1	1	-	1
			TOTAL	198	164	22	149

Source: Development Planning and Research Associates Inc., estimates based on the Development Document, industry surveys, and Census of Manufacturers.

b. Projected Plant Closures

The projected plant closures resulting from the impact of various BAT treatment alternatives are shown in Table VIII-8. A total of 11 alternative treatment scenarios were considered excluding three scenarios applicable to wool scouring only (M,N, and P). The impacts resulting from the 11 scenarios are shown below:

Impact Summary - Direct Dischargers

Alternatives		No. of problem segments
A	BPT	1
B	Chemical coagulation and sedimentation	11
C	Multi-media filtration	8
D	B plus multi-media filtration	15
E	C plus granular activated carbon	10
F	D plus granular activated carbon	19
G	Ozonation	13
H	B plus ozonation	16
I	Powdered activated carbon	11
J	C plus ozonation	10
K	D plus ozonation	14

Treatment Alternative F is projected to have the most severe impact with closures in 15 of the plant categories plus an additional four model plant categories shown as marginal. Treatment Alternatives H, D, K, G, E, B, I and D demonstrate economic problems (closure or marginal) in 11 of 16 categories.

Estimated total plant closures resulting from the 149 direct dischargers requiring installation of some type of treatment alternative is shown in Table VIII-9. If a model plant was projected as a closure, all of the plants represented by that model were projected as closures. In the case of marginal categories approximately half of the plants represented by that model were projected as closures depending upon the distribution of plants within that category and the economic conditions of those plants.

The largest number of closures are projected under Treatment Alternative F with a total of 27 plants closing. Closures include plants in wool, woven fabric, knit fabric and yarn subcategories. Under Alternative K,20 plants are projected to close with a decreasing number under the other alternatives.

In the preliminary review process leading to the recommended options and after the preliminary impacts were known, EPA reduced the number of treatment alternative to four: Alternatives A-D. A more detailed examination of the estimated closure effects of these four alternatives is shown below:

Table VIII- 8. The textile industry, representative existing model plant impacts 1/, projected closures attributable to expenditures for wastewater control-direct dischargers

Subcategory	Size	Daily Capacity	Type Plant	Baseline	Treatment alternatives (BAT)-existing sources A	B	C	D	E	F	G	H	I	J	K
		(kkg)													
1. Wool scouring										(M	N	P)2/			
	Small	16.2	Commission	C	NA	NA	C	C	NA	C	C	C			
	Medium	85.6	Commission	C	NA	NA	C	C	NA	C	C	C			
	Large	81.0	Commission	M	NA	NA	C	C	NA	C	C	C			
2. Wool finishing	Small	7.4	Integrated		NA	M	NA	M	NA	C	M	C	M	NA	C
	Medium	18.6	Integrated		NA		NA		NA					NA	M
	Large	37.3	Integrated		NA		NA		NA					NA	
3. (Omitted)															
4. Woven fabric finishing															
a. Simple processing	Small	5.4	Commission		NA	C	C	C	C	C	C	C	C	C	C
			Own fabric	M	NA	C	C	C	C	C	C	C	C	C	C
			Integrated		NA										
	Medium	29.6	Commission		NA	M		M	M	C	M	M	M	M	C
			Own fabric		NA										
			Integrated		NA										
	Large	73.9	Commission		NA										
			Integrated		NA										
b. Complex processing	Small	23.3	Commission		NA	M		C	C	C	M	C	C	M	C
			Integrated		NA										
	Medium	116.3	Commission		NA			M	M	C	M	M		M	M
			Own fabric		NA										
			Integrated		NA										
	Large	193.8	Integrated		NA										
c. Desizing	Small	21.4	Commission		NA	M		C	C	C	M	C	C	C	C
			Own fabric		NA					M		M			M
			Integrated		NA										
	Medium	53.6	Commission		NA										
			Own fabric		NA										
			Integrated		NA										
	Large	178.5	Own fabric		NA										
			Integrated		NA										
5. Knit fabric finishing															
a. Simple processing	Small	8.0	Commission		NA	M		M	M	C		C	M	M	C
			Integrated		NA										
	Medium	32.2	Commission		NA										
			Integrated		NA										
	Large	160.8	Commission		NA										
			Integrated		NA										
b. Complex processing	Small	7.7	Commission		NA	M		M	M	C		C	M	M	C
			Integrated		NA										
	Medium	18.5	Integrated		NA										
	Large	30.9	Commission		NA										
			Integrated		NA										

Continued.....

Table VIII-8. (Continued)

Subcategory	Size	Daily Capacity	Type Plant	Baseline	Treatment alternatives (BAT)-existing sources										
					A	B	C	D	E	F	G	H	I	J	K
		(kkg)													
5. Knit fabric finishing (continued)															
c. Hosiery products	Small	2.5	Own hosiery		C	C	C	C	NA	C	C	C	C	NA	C
			Integrated						NA					NA	
	Medium	5.5	Own hosiery						NA	M				NA	
6. Carpet finishing	Small	20.2	Integrated		NA										
	Medium	48.6	Integrated		NA										
	Large	121.5	Integrated		NA										
7. Stock and yarn finishing	Small	9.8	Commission		NA	C	M	C	C	C	C	C	C	C	C
			Own yarn	M	NA	C	M	C	C	C	C	C	C	C	C
			Integrated							M					
	Medium	23.5	Own yarn		NA										
			Integrated		NA										
	Large	39.1	Own yarn		NA										
			Integrated		NA										
	X-Large	58.6	Integrated		NA										
8. Nonwoven manufacturing	Small	10.4	NA												
	Medium	23.6	NA												
9. Felted fabric processing	Small	0.9	NA				NA		NA					NA	
	Medium	2.0	NA				NA		NA	M				NA	

1/ Treatment alternatives for which model plants are projected to close are designated with letter "C"; letter "M" designates marginal operations.

2/ Treatment Alternatives M, N and P are applicable to wool scouring, only.

Table VIII-9. The textile industry, projected plant closures based on NPV analysis of representative model plants - direct dischargers.

Subcategory	Size	Daily capacity	Type plant	Number of plants requiring controls (after baseline closures)	Treatment alternatives (BAI) -- existing sources													
					A	B	C	D	E	F	G	H	I	J	K	M1/	N1/	P1/
		(kkg)																
1. Wool scouring	Small	16.2	Commission	1			1	1								1	1	1
	Medium	35.6	Commission	1			1	1								1	1	1
	Large	81.0	Commission	1			1	1								1	1	1
2. Wool finishing	Small	7.4	Integrated	3		2	NA	2	NA	3	2	3	2	NA	3			
	Medium	18.6	Integrated	1			NA		NA					NA	1			
	Large	37.3	Integrated	2			NA		NA					NA				
3. (Omitted)																		
4. Woven fabric finishing																		
a. Simple processing	Small	5.4	Commission	1		1	1	1	1	1	1	1	1	1	1			
			Own fabric															
			Integrated	4														
	Medium	29.6	Commission	3		2		2	2	3	2	2	2	2	3			
			Own fabric															
			Integrated	6														
	Large	73.9	Commission	1														
			Integrated	5														
b. Complex processing	Small	23.3	Commission	1		1		1	1	1	1	1	1	1	1			
			Integrated	4														
	Medium	116.3	Commission	1				1	1	1	1	1		1	1			
			Own fabric	5														
			Integrated	2														
	Large	193.8	Integrated	1														
c. Desizing	Small	21.4	Commission	2		1		2	2	2	1	2	2	2	2			
			Own fabric	3						2		2			2			
			Integrated	3														
	Medium	53.6	Commission	1														
			Own fabric	3														
			Integrated	4														
	Large	178.5	Own fabric	9														
			Integrated	2														
5. Knit fabric finishing																		
a. Simple processing	Small	8.0	Commission	1		1		1	1	1		1	1	1	1			
			Integrated	6														
	Medium	32.2	Commission	2														
			Integrated	7														
	Large	160.8	Commission	1														
			Integrated	2														

continued...

Table VIII-9. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Number of plants requiring controls (after baseline closures)	Treatment alternatives (BAT) -- existing sources A	B	C	D	E	F	G	H	I	J	K	M[1/]	N[1/]	P[1/]
5. Knit fabric finishing (continued)																		
b. Complex processing	Small	7.7	Commission	1		1		1	1	1		1	1	1	1			
			Integrated	4														
	Medium	18.5	Integrated	5														
	Large	30.9	Commission	1														
			Integrated	1														
c. Hosiery products	Small	2.5	Own hosiery	1	1	1	1	1	NA	1	1	1	1	NA	1			
			Integrated	4					NA					NA				
	Medium	5.5	Own hosiery	1					NA	1				NA				
6. Carpet finishing	Small	20.2	Integrated	3														
	Medium	48.6	Integrated	3														
	Large	121.5	Integrated															
7. Stock & yarn finishing	Small	9.8	Commission	2		2	1	2	2	2	2	2	2	2	2			
			Own yarn	1		1	1	1	1	1	1	1	1	1	1			
			Integrated	13						7								
	Medium	23.5	Own yarn	3														
			Integrated	2														
	Large	39.1	Own yarn	2														
			Integrated	3														
	X-Large	58.6	Integrated	4														
8. Nonwoven manufacturing	Small	10.4	N.A.	3														
	Medium	23.6	N.A.	2														
9. Felted fabric processing	Small	0.9	N.A.															
	Medium	2.0	N.A.	1														
			TOTAL	149	1	13	7	18	12	27	12	18	14	12	20	3	3	3

[1/] Treatment alternative M, N, and P are applicable to wool scouring only.

Estimated Plant Closures - Direct Dischargers
(After baseline)

Subcategory	Size	Type Plant	Treatment Alternatives A	B	C	D
		Options:	1	3	2	4
Wool scouring	Small, Medium and Large		NA	NA	3	3
Wool finishing	Small	Integrated		2	NA	2
Woven fabric finishing						
- Simple processing	Small	Commission		1	1	1
	Medium	Commission		2		2
- Complex processing	Small	Commission		1		1
	Medium	Commission				1
- Desizing	Small	Commission		1		2
Knit fabric finishing						
- Simple processing	Small	Commission		1		1
- Complex processing	Small	Commission		1		1
- Hosiery products	Small	Own hosiery	1	1	1	1
Stock and yarn finishing	Small	Commission		2	1	2
	Small	Own yarn		1	1	1
		Total	1	13	7	18

Under Option 1 (BPT), one 'own hosiery' plant is projected to close. Under Option 2, seven plants are projected to close: 3 in wool scouring, one in woven fabric, one in hosiery products and two in stock and yarn finishing. Thirteen plants are projected to close under Option 3. These include plants in the wool, woven, knit and yarn finishing subcategories. The largest projected closures occur under Option 4 with 18 plants projected to close.

4. Effects of Combining RCRA Costs with BAT

The impacts of RCRA costs were analyzed in two steps. First, the RCRA costs were applied to the model plants without BAT controls; second, RCRA costs were combined with the costs of BAT treatment alternatives. The effects of RCRA in each of the cases are very minor. With the application of RCRA cost only, the required price increases for the model plants are generally under 0.1 percent. The largest increase is required by the small commission woven (simple) model with 0.4 percent required. Three models show a required increase of 0.2 percent. All other models require increases of 0.1 percent or less.

The reductions in model plant profit levels are also relatively minor. Reductions are generally under one percent. The most significant reductions occur among the small commission and own fabric models. Two models have profits reduced over 10 percent: the small commission woven (simple) and the small own hosiery models. The profits of two models are reduced by about 5 percent; the small own fabric woven (simple) and small commission yarn models. The next largest reductions occur for the small commission knit fabric models (simple and complex) with reductions of about 3 percent. The reductions for the other small models are generally about one percent. The reductions for the medium and large models are in most cases, less than 0.1 percent.

The combination of RCRA with BAT costs result in only minor increases in impacts over the BAT impacts. Table VIII-10 compares the returns on sales of the small plants under BAT only and under combined BAT and RCRA (the comparison was limited to the small plants since the returns of the medium and large plants were generally identical for both of the cost categories).

As shown in the table, returns on sales were generally decreased by about one-tenth of a percentage point when RCRA costs were applied to baseline conditions. This amounts to about a 5 percent reduction or less in after-tax profits. The only model plant which shows differences in returns greater than one-tenth of a percentage point is the small commission woven (simple) model. It has a 1.8 percent return on sales under baseline; with the addition of RCRA costs this is reduced to 1.7 percent. Under the BAT treatment alternatives, the returns all become negative. With the addition of RCRA to BAT costs, these negative returns are reduced in most cases by about three-tenths of percentage point.

In terms of viability of the model plants, the addition of RCRA costs to BAT has no noticeable effect except for the medium commission woven (simple) model. Under Treatment Alternative H, the model is indicated as marginal. When RCRA is added to the cost of that treatment it is indicated as a potential closure. In actuality, this is caused by very minor changes in the cash flow and net present value.

B. Best Conventional Pollutant Control Technology (BCT)

BCT is not an additional limitation, but replaces BAT for the control of conventional pollutants. BCT requires that limitations for conventional pollutants be assessed in light of a "cost reasonableness test", which involves a comparison of the cost and level of reduction of conventional pollutants from the discharge of POTW's to the cost and level of reduction of such pollutants from a class or category of industrial sources. In addition to the applicable wet processors in the other subcategories, three water jet weaving mills (subcategory 3a) will be required to meet the BCT effluent limitations.

1. Water Jet Weaving

The impacts on the two water jet weaving models are discussed below.

Table VIII-10. The textile industry, the impacts of RCRA expenditures on the returns on sales of small model plants (comparison of impacts of BAT and RCRA combined with BAT)1/ - direct dischargers

Subcategory	Daily capacity	Type plant	Baseline		RCRA only	Treatment alternatives (BAT) -- existing sources										
						A	B	C	D	E	F	G	H	I	J	K
	(kkg)		(percent)													
											(M	N	P) 2/			
1. Wool scouring	16.2	Commission	3.6	BAT		NA	NA	-6.0	-10.1	NA	-10.2	-14.1	-11.6	NA	NA	NA
				BAT & RCRA	3.5	NA	NA	-6.0	-10.2	NA	-10.2	-14.1	-11.7	NA	NA	NA
2. Wool finishing	7.4	Integrated	1.6	BAT		NA	1.1	NA	1.0	NA	0.4	1.1	0.8	0.9	NA	0.6
				BAT & RCRA	1.6	NA	1.1	NA	1.0	NA	0.4	1.1	0.7	0.9	NA	0.6
3. (Omitted)																
4. Woven fabric finishing																
a. Simple processing	5.4	Commission	1.8	BAT		NA	-3.2	-0.4	-4.0	-7.6	-11.1	-1.6	-5.2	-3.3	-2.4	-6.0
				BAT & RCRA	1.7	NA	-3.5	-0.7	-4.3	-7.8	-11.4	-1.9	-5.5	-3.6	-2.7	-6.3
		Own fabric	1.0	BAT		NA	-0.5	0.4	-0.7	-1.9	-3.1	0.1	-1.1	-0.5	-0.2	-1.4
				BAT & RCRA	1.0	NA	-0.6	0.3	-0.8	-2.0	-3.2	0.0	-1.2	-0.6	-0.3	-1.5
		Integrated	2.3	BAT		NA	1.8	2.0	1.7	1.3	1.0	1.9	1.6	1.8	1.8	1.5
				BAT & RCRA	2.3	NA	1.7	2.0	1.7	1.3	1.0	1.9	1.5	1.7	1.8	1.5
b. Complex processing	23.3	Commission	2.2	BAT		NA	0.9	1.5	0.5	-0.1	-1.4	0.9	-0.3	0.3	0.5	-0.8
				BAT & RCRA	2.1	NA	0.9	1.5	0.5	-0.1	-1.5	0.9	-0.3	0.3	0.4	-0.8
		Integrated	2.7	BAT		NA	2.5	2.5	2.4	2.3	2.2	2.5	2.3	2.4	2.4	2.2
				BAT & RCRA	2.7	NA	2.4	2.5	2.4	2.3	2.2	2.5	2.3	2.4	2.4	2.2
c. Desizing	21.4	Commission	2.4	BAT		NA	1.0	1.6	0.6	0.0	-1.5	1.0	-0.2	0.4	0.5	-0.8
				BAT & RCRA	2.3	NA	1.0	1.6	0.5	-0.1	-1.5	1.0	-0.3	0.3	0.5	-0.8
		Own fabric	1.5	BAT		NA	1.1	1.3	1.0	0.9	0.6	1.1	0.8	1.0	1.0	0.7
				BAT & RCRA	1.5	NA	1.1	1.3	1.0	0.9	0.6	1.1	0.8	0.9	1.0	0.7
		Integrated	2.7	BAT		NA	2.5	2.6	2.4	2.4	2.2	2.5	2.3	2.4	2.4	2.3
				BAT & RCRA	2.7	NA	2.5	2.6	2.4	2.4	2.2	2.5	2.3	2.4	2.4	
5. Knit fabric finishing																
a. Simple processing	8.0	Commission	2.7	BAT		NA	0.4	1.6	-0.2	-0.9	-3.2	0.9	-1.2	-0.1	0.3	-1.9
				BAT & RCRA	2.7	NA	0.3	1.5	-0.3	-1.0	-3.3	0.8	-1.3	-0.2	0.1	-2.0
		Integrated	2.5	BAT		NA	2.1	2.3	2.0	1.9	1.7	2.2	1.9	2.0	2.1	1.8
				BAT & RCRA	2.5	NA	2.1	2.3	2.0	1.9	1.6	2.1	1.9	2.0	2.0	1.8
b. Complex processing	7.7	Commission	2.7	BAT		NA	0.3	1.5	-0.3	-1.0	-3.4	0.8	-1.3	-0.2	0.2	-2.1
				BAT & RCRA	2.7	NA	0.2	1.4	-0.4	-1.2	-3.5	0.7	-1.5	-0.3	0.0	-2.2
		Integrated	2.5	BAT		NA	2.1	2.3	2.0	1.9	1.7	2.2	1.9	2.0	2.1	1.8
				BAT & RCRA	2.4	NA	2.1	2.3	2.0	1.9	1.7	2.1	1.9	2.0	2.1	1.8
c. Hosiery products	2.5	Own hosiery	0.8	BAT		-0.9	-1.2	0.0	-1.4	NA	-2.8	-0.4	-1.7	-1.1	NA	-1.9
				BAT & RCRA	0.7	-1.0	-1.3	-0.1	-1.5	NA	-2.9	-0.5	-1.9	-1.2	NA	-2.0
		Integrated	3.0	BAT		2.5	2.5	2.7	2.4	NA	2.1	2.7	2.4	2.5	NA	2.3
				BAT & RCRA	2.9	2.5	2.5	2.7	2.4	NA	2.1	2.6	2.3	2.5	NA	2.3

continued...

Table VIII-10. (continued)

Subcategory	Daily capacity	Type plant	Baseline		RCRA only	Treatment alternatives (BAT) -- existing sources A	B	C	D	E	F	G	H	I	J	K
	(kkg)		(percent)													
6. Carpet finishing	20.2	Integrated	2.4	BAT		2.1	2.2	2.0	2.0	1.8	2.1	1.9	2.0	2.1	1.9	
				BAT & RCRA	2.3											
7. Stock & yarn finishing	9.8	Commission	2.1	BAT		NA	-1.3	0.5	-2.2	-3.1	-6.1	-0.6	-3.6	-2.1	-1.5	-4.5
				BAT & RCRA	2.0	NA	-1.5	0.4	-2.4	-3.3	-6.3	-0.7	-3.8	-2.3	-1.7	-4.7
		Own yarn	1.0	BAT		NA	0.6	0.8	0.5	0.4	0.1	0.6	0.4	0.5	0.6	0.3
				BAT & RCRA	0.9	NA		0.7								
		Integrated	2.0	BAT		NA	1.1	1.5	0.9	0.7	-0.1	1.3	0.6	1.0	1.1	0.4
				BAT & RCRA	1.9	NA				0.6		1.2		0.9	1.0	0.3
8. Nonwoven manufacturing	10.4	NA	2.6	BAT		1.9	1.9	2.2	1.8	1.4	1.0	2.1	1.7	1.9	2.0	1.6
				BAT & RCRA	2.6											
9. Felted fabric processing	0.9	NA	5.3	BAT		4.3	4.2	NA	4.1	NA	3.4	4.6	3.9	4.2	NA	3.8
				BAT & RCRA	5.3		4.1	NA	4.0	NA	3.3	4.5	3.8			3.7

1/ Two lines are shown for each model plant. The first line shows the returns for BAT only; the second line shows only those returns for BAT and RCRA.

2/ Treatment alternatives M, N, and P are applicable to wool scouring only.

a. Price Effects

The required price increases for each of the two models are listed below. For the small model, the largest increase (1.3 percent) is required under Treatment Alternative D. The smallest increase occurs under Alternative C (Option 2). An increase of 1.2 percent is required under Alternative A (Option 1/BPT). The increases required by the medium model under the alternatives are about one-half that required of the small model. An increase of 0.7 percent is required under Alternative A (Option 1).

Model Size	Required Price Increase - Water Jet Weaving			
	Treatment Alternatives - BCT			
	A	B	C	D
	(percent)			
Small	1.2	1.0	0.6	1.3
Medium	0.7	0.6	0.3	0.8

The water jet weaving mills are relatively more profitable (as are greige mills in general) than the finishers discussed elsewhere in this analysis. The small model has a 3.8 percent return on sales under baseline. This is reduced by 30 percent under the costs of Alternative A (Option 1) and Alternative B (Option 3) to a return of 2.6 percent. The least reduction occurs under Alternative C (Option 2) with a 16 percent reduction to a return of 3.2 percent. Under the baseline, the large model has a slightly lower return on sales of 3.6 percent. The reductions in profits under BCT are less than 20 percent for all alternatives. Under Alternative A the return on sales is reduced to 3.0 percent.

Model Size	Baseline	Return on Sales (after-tax) - Water Jet Weaving			
		Treatment Alternatives - BCT			
		A	B	C	D
	(percent)				
Small	3.8	2.6	2.6	3.2	2.6
Medium	3.6	3.0	3.0	3.3	2.9

The baseline after-tax return on assets for both models is about 18 percent. Under Alternative A (Option 1), the returns are reduced to about 12 percent for the small model and 15 percent for the medium.

Model Size	Return on Assets (after-tax) - Water Jet Weaving				
	Baseline	A	B	C	D
	(percent)				
Small	18.8	12.3	12.4	15.4	11.5
Medium	18.2	14.5	14.8	16.3	14.1

The annual cash flow (year 21) for the small model under baseline is $952,000. This is reduced to around $770,000 under Alternative A and $850,000 under Alternative C. The flow of the medium model exceeds $2.1 million under baseline. This is reduced to $1,900 under Alternatives A and B. Under Alternative C it is reduced to just over $2 million.

Model Size	Baseline	Annual Cash Flow - Water Jet Weaving Treatment Alternatives-BCT A	 B	 C	 D
	($1,000)				
Small	2,249	1,590	1,554	1,902	1,473
Medium	4,886	4,052	4,074	4,467	3,935

While the reductions in profits and NPV are substantial for both models, they remain viable under all treatment levels. No closures are projected.

2. BCT Impacts on Other Subcategories

Listed below are the size cutoffs established for each of the subcategories under BCT and an indication of where each model plant falls relative to these cutoffs: small (below cutoff) or large (above cutoff). The "small" plants will be required to meet Alternative A (Option 1/BPT), only. With the exception of the wool finishing and felted models, all "large" models will be required to meet BAT (or as specifically recommended Alternative C (Option 2). The wool finishing models will be required to meet Option 4 while the felted models will be required to meet Option 1/BPT only. Based on the size cutoffs only nine model plants are designated as large and would be required to meet Option 2. As indicated above, all of these model plants are viable under Alternative C (Option 2). In the "small" category, all plants except the hosiery and felted model are assumed to have already met BPT requirements (Option 1). Both the felted and hosiery models are required to add BPT controls. Based on the BAT analysis above, the small own hosiery model is projected as a closure under this alternative. Consequently, under BCT, this model is the only model plant which would be projected to close.

BCT Distribution
(by Model Plant Sizes)

	Size Cutoff (kkg/yr)	Small (Option 1)	Large (Option 2) 1/
1. Wool scouring	1,600	--	S, M, L
2. Wool finishing	11,800	S, M, L	--
3. (Omitted)			
4. Woven fabric finishing			
a. Simple processing	9,900	S, M	L
b. Complex processing	11,600	S	M, L
c. Desizing	15,200	S, M	L
5. Knit fabric finishing			
a. Simple processing	11,300	S, M	L
b. Complex processing	13,100	S, M, L	--
c. Hosiery products	7,600	S, M	--
6. Carpet finishing	12,200	S, M	L
7. Stock & yarn finishing	12,700	S, M, L, XL	--
8. Nonwoven manufacturing	37,900	S, M	
9. Felted fabric processing	NA	S, M	

1/ Except for wool finishing (Option 4) and felted fabric processing (Option 1).

C. Pretreatment Standards for Existing Sources (PSES)

1. Required Price Increases

The required price increases due to PSES for the existing indirect discharger model plants are shown in Table VIII-11. The largest increases are required for the small commission models with price increases varying between 3 and 5 percent under Alternative B for all subcategories (Alternative M for wool scouring). These increases are only slightly higher under Alternative D. However, under Alternative F the increases are appreciably higher. Under this Alternative, the increase required for the small commission woven (simple) model is about 8 percent while that for the small commission yarn model exceeds 10 percent.

For the large integrated models the increases required are less than one percent for all subcategories except yarn finishing. In that subcategory, the large model shows a required increase of 1.6 percent under Alternative F. The large commission models, in most cases, show increases varying between about one percent for Alternative B to around three percent for Alternative F. The large commission yarn model shows required increases varying from about two percent for Alternative B to close to six percent for Alternative F. The required increases for the felted fabric model varies from about three percent for Alternative B to over 10 percent for Alternative F.

2. Financial Effects

As pointed out in the discussion of the BAT analysis, changes in the model plant profiles of the indirect dischargers under PSES are based on the assumption of no increase in prices.

a. Return on Sales

The 21-year average after-tax returns on sales for the model plants both under baseline and under PSES controls are shown in Table VIII-12; the reductions associated with the imposition of controls are contained in Table VIII-13. The impacts of PSES on the indirect discharger model plants are substantially higher than the impacts of BAT controls on the direct discharger models. The small commission models in all subcategories show negative returns under most of the alternatives. The returns generally reflect substantial reductions from baseline. For example, the returns of the small wool scouring model show reductions of over 300 percent under the two least stringent alternatives. The small commission woven (simple) model incurs reductions of about 600 percent under Alternative B and D and over 1,000 percent under Alternative F.

In addition to the commission models, both the small own woven (simple) and the own yarn models have negative returns under most of the Alternatives. Several small integrated models have low levels of profits, including wool finishing, woven (simple) and yarn.

Table VIII-11. The textile industry, representative existing model plants impacts, average price increase necessary to offset expenditures for wastewater controls - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (PSES) -- existing sources							
				B	D	F	H	J	M1/	N1/	P1/
		(kkg)		(percent)							
1. Wool scouring	Small	16.2	Commission	3.9	NA	NA	NA	NA	4.5	6.6	5.5
	Large	81.0	Commission	1.0	NA	NA	NA	NA	1.1	2.5	1.3
2. Wool finishing	Small	3.1	Integrated	1.0	1.3	2.6	1.5	1.5			
	Medium	18.6	Integrated	0.3	0.4	0.9	0.6	0.6			
	Large	57.3	Integrated	0.2	0.3	0.7	0.5	0.5			
3. (Omitted)											
4. Woven fabric finishing a. Simple processing	Small	2.4	Commission	4.8	5.5	7.8	6.1	6.2			
			Own fabric	1.4	1.6	2.3	1.8	1.8			
			Integrated	1.2	1.3	1.4	1.5	1.5			
	Medium	12.3	Commission	1.2	1.6	4.7	1.8	1.8			
			Own fabric	0.6	0.8	1.8	1.0	1.0			
			Integrated	0.3	0.4	0.9	0.5	0.5			
	Large	49.3	Commission	0.6	0.8	1.8	1.2	1.2			
			Own fabric	0.2	0.3	0.7	0.5	0.5			
			Integrated	0.2	0.2	0.5	0.3	0.3			
b. Complex processing	Small	9.7	Commission	1.5	2.4	5.0	2.9	NA			
			Own fabric	0.8	1.0	2.1	1.2	NA			
			Integrated	0.4	0.5	1.1	0.6	NA			
	Medium	23.3	Commission	1.1	1.7	3.3	2.0	NA			
			Own fabric	0.4	0.6	1.2	0.7	NA			
			Integrated	0.2	0.3	0.7	0.4	NA			
	Large	116.3	Commission	0.4	0.6	1.4	1.0	NA			
			Own fabric	0.2	0.3	0.6	0.4	NA			
			Integrated	0.1	0.2	0.5	0.3	NA			
c. Desizing	Small	21.4	Commission	1.2	1.8	3.4	2.0	NA			
			Own fabric	0.5	0.7	1.4	0.9	NA			
			Integrated	0.3	0.4	0.8	0.5	NA			
	Medium	53.6	Commission	0.7	1.0	2.1	1.4	NA			
			Own fabric	0.3	0.4	0.9	0.6	NA			
			Integrated	0.2	0.3	0.6	0.4	NA			
	Large	178.5	Own fabric	0.2	0.2	0.6	0.4	NA			
			Integrated	0.1	0.2	0.5	0.3	NA			
5. Knit fabric finishing a. Simple processing	Small	1.6	Commission	3.2	3.7	5.1	4.1	4.1			
			Integrated	1.4	1.6	1.6	1.3	1.3			
	Medium	19.3	Commission	1.4	2.0	3.8	2.6	2.6			
			Integrated	0.2	0.3	0.7	0.4	0.4			

Table VIII-11. (continued)

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (PSES) -- existing sources B	D	F	H	J	M	N	P
		(kkg)		(percent)							
5. Knit fabric finishing (continued)											
a. Simple processing	Large	32.2	Commission	1.1	1.5	3.2	2.1	2.1			
			Integrated	0.2	0.3	0.6	0.4	0.4			
b. Complex processing	Small	7.7	Commission	1.3	1.7	2.8	1.8	1.7			
			Integrated	0.5	0.6	1.7	0.7	0.7			
	Medium	18.5	Commission	1.5	2.1	4.4	2.7	2.7			
			Integrated	0.2	0.3	0.7	0.4	0.4			
	Large	46.3	Commission	0.9	1.2	2.7	1.8	1.8			
			Integrated	0.1	0.2	0.5	0.3	0.3			
c. Hosiery products	Small	2.5	Own hosiery	0.8	0.9	0.9	0.9	0.9			
			Integrated	0.5	0.6	0.8	0.6	0.7			
	Medium	5.5	Own hosiery	0.4	0.4	0.7	0.5	0.5			
			Integrated	0.5	0.6	0.9	0.6	0.6			
	Large	12.6	Own hosiery	0.2	0.2	0.5	0.3	0.3			
			Integrated	0.2	0.3	0.7	0.4	0.4			
6. Carpet finishing	Small	8.9	Integrated	0.6	0.7	1.2	0.8	0.8			
	Medium	48.6	Integrated	0.3	0.4	0.8	0.5	0.5			
	Large	121.6	Integrated	0.3	0.4	0.8	0.5	0.5			
7. Stock & yarn finishing	Small	4.3	Commission	5.2	6.5	10.6	7.4	7.5			
			Own yarn	0.8	1.2	1.5	1.5	1.5			
			Integrated	1.1	1.3	2.3	1.4	1.5			
	Medium	9.8	Commission	2.5	3.8	7.7	4.5	4.5			
			Own yarn	0.8	1.1	2.1	1.3	1.3			
			Integrated	0.9	1.2	2.5	1.3	1.4			
	Large	23.5	Commission	2.3	2.7	5.7	3.5	3.7			
			Own yarn	0.6	0.8	1.7	1.0	1.0			
			Integrated	0.5	0.7	1.6	1.0	1.0			
	X-Large	58.6	Own yarn	0.4	0.5	1.1	0.7	0.7			
			Integrated	0.3	0.5	1.1	0.7	0.7			
8. Nonwoven manufacturing	Small	10.4	N.A.	0.5	0.7	1.1	0.8	0.8			
	Medium	23.6	N.A.	0.3	0.4	0.8	0.4	0.4			
	Large	56.7	N.A.	0.2	0.2	0.5	0.3	0.3			
9. Felted fabric processing	Small	0.9	N.A.	1.2	1.4	1.9	1.5	NA			
	Medium	4.4	N.A.	0.7	1.0	2.0	1.2	NA			
	Large	10.7	N.A.	3.1	4.8	10.8	6.4	NA			

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Table VIII-12. The textile industry, representative existing model plant impacts, effects of wastewater control expenditures on average after-tax returns on sales - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (PSES) -- existing source							
					B	D	F	H	J	M1/	N1/	P1/
		(kkg)										
1. Wool scouring	Small	16.2	Commission	3.6	-7.4	NA	NA	NA	NA	-8.3	-15.0	-10.9
	Large	81.0	Commission	2.0	0.7	NA	NA	NA	NA	0.6	-0.7	0.0
2. Wool finishing	Small	3.1	Integrated	1.9	0.9	0.7	-0.5	0.3	0.3			
	Medium	18.6	Integrated	3.7	3.4	3.3	3.0	3.1	3.2			
	Large	57.3	Integrated	3.7	3.4	3.4	3.1	3.2	3.3			
3. (Omitted)												
4. Woven fabric finishing												
a. Simple processing	Small	2.4	Commission	1.9	-9.6	-10.5	-17.7	-12.5	-12.4			
			Own fabric	1.1	-2.6	-2.9	-5.3	-3.5	-3.5			
			Integrated	2.5	1.3	1.2	0.2	0.9	0.9			
	Medium	12.3	Commission	2.5	0.1	-0.5	-3.3	-1.5	-1.4			
			Own fabric	1.7	1.1	1.0	0.4	0.8	0.8			
			Integrated	2.6	2.3	2.3	2.1	2.2	2.2			
	Large	49.3	Commission	4.0	3.4	3.2	2.6	2.9	3.0			
			Own fabric	2.4	2.2	2.1	1.9	2.0	2.0			
			Integrated	3.1	2.9	2.9	2.7	2.8	2.8			
b. Complex processing	Small	9.7	Commission	2.5	-0.8	-1.6	-5.2	-2.9	NA			
			Own fabric	1.8	1.0	0.8	0.0	0.6	NA			
			Integrated	2.6	2.2	2.2	1.9	2.1	NA			
	Medium	23.3	Commission	2.2	0.4	-0.1	-2.5	-1.1	NA			
			Own fabric	1.5	1.1	1.0	0.6	0.8	NA			
			Integrated	2.7	2.4	2.4	2.1	2.3	NA			
	Large	116.3	Commission	2.9	2.4	2.3	1.7	2.0	NA			
			Own fabric	2.0	1.9	1.8	1.6	1.7	NA			
			Integrated	3.1	3.0	2.9	2.7	2.8	NA			
c. Desizing	Small	21.4	Commission	2.4	0.6	0.1	-2.3	-0.9	NA			
			Own fabric	1.5	1.0	0.9	0.4	0.7	NA			
			Integrated	2.7	2.4	2.3	2.1	2.2	NA			
	Medium	53.6	Commission	4.2	3.6	3.4	2.6	3.0	NA			
			Own fabric	2.4	2.1	2.1	1.7	1.9	NA			
			Integrated	3.0	2.8	2.7	2.5	2.6	NA			
	Large	178.5	Own fabric	2.0	1.8	1.8	1.5	1.6	NA			
			Integrated	3.0	2.9	2.8	2.6	2.7	NA			

continued...

Table VIII-12. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternative (PSES) -- existing source B	D	F	H	J	M	N	P
5. Knit fabric finishing												
a. Simple processing	Small	1.6	Commission	3.2	-4.6	-5.3	-10.8	-6.8	-6.8			
			Integrated	2.0	-0.4	-0.7	-2.7	-1.2	-1.2			
	Medium	19.3	Commission	3.9	2.4	2.1	0.5	1.5	1.6			
			Integrated	2.1	1.8	1.8	1.6	1.7	1.7			
	Large	32.2	Commission	3.8	2.7	2.5	1.2	1.9	2.0			
			Integrated	2.9	2.7	2.6	2.5	2.5	2.6			
b. Complex processing	Small	7.7	Commission	2.6	1.0	0.6	-1.1	0.1	0.1			
			Integrated	2.5	2.0	1.9	1.6	1.8	1.8			
	Medium	18.5	Commission	3.9	2.4	2.0	0.3	1.3	1.4			
			Integrated	2.0	1.8	1.8	1.5	1.7	1.7			
	Large	46.3	Commission	3.8	2.9	2.7	1.6	2.2	2.3			
			Integrated	2.9	2.7	2.7	2.5	2.6	2.6			
c. Hosiery products	Small	2.5	Own hosiery	1.2	0.0	-0.2	-1.2	-0.4	-0.4			
			Integrated	1.9	1.4	1.3	1.0	1.2	1.2			
	Medium	5.5	Own hosiery	2.0	1.6	1.5	1.1	1.5	1.5			
			Integrated	3.1	2.7	2.6	2.1	2.5	2.5			
	Large	12.6	Own hosiery	1.9	1.7	1.7	1.6	1.7	1.7			
			Integrated	3.1	2.8	2.8	2.6	2.7	2.7			
6. Carpet finishing	Small	8.9	Integrated	2.4	1.8	1.8	1.1	1.6	1.6			
	Medium	48.6	Integrated	1.7	1.4	1.3	1.1	1.2	1.2			
	Large	121.6	Integrated	2.0	1.8	1.7	1.4	1.5	1.6			
7. Stock & yarn finishing	Small	4.3	Commission	2.4	-9.7	-11.3	-26.2	-13.9	-13.8			
			Own yarn	1.8	0.1	-0.2	-3.1	-0.7	-0.6			
			Integrated	2.1	0.0	-0.4	-4.1	-1.0	-1.0			
	Medium	9.8	Commission	3.2	-1.7	-2.9	-8.1	-4.7	-4.6			
			Own yarn	1.6	0.8	0.6	-0.3	0.3	0.4			
			Integrated	2.0	1.0	0.8	-0.2	0.5	0.5			
	Large	23.5	Commission	3.5	0.7	-0.1	-4.0	-1.7	-1.4			
			Own yarn	2.3	1.8	1.6	1.1	1.4	1.4			
			Integrated	2.2	1.7	1.5	1.1	1.3	1.4			
	X-Large	58.6	Own yarn	3.1	2.8	2.7	2.3	2.5	2.5			
			Integrated	2.2	1.8	1.7	1.3	1.5	1.6			

continued...

Table VIII-12. (continued)

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (PSES) -- existing sources							
					B	D	F	H	J	M	N	P
		(kkg)										
8. Nonwoven manufacturing	Small	10.4	NA	2.6	2.0	1.9	1.3	1.8	1.8			
	Medium	23.6	NA	2.3	2.1	2.0	1.8	1.9	1.9			
	Large	56.7	NA	3.1	2.9	2.9	2.8	2.8	2.9			
9. Felted fabric processing	Small	0.9	NA	5.3	4.1	4.0	3.3	3.8	NA			
	Medium	4.4	NA	2.0	1.2	1.1	0.4	0.9	NA			
	Large	10.7	NA	1.2	-7.0	-8.8	-16.3	-12.2	NA			

1/ Treatment alternatives M, N, and P apply to wool scouring only.

Table VIII-13. The textile industry, representative existing model plant impacts, percentage reduction in models' after-tax returns on sales due to wastewater control expenditures - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (PSES) -- existing sources							
				B	D	F	H	J	M1/	N1/	P1/
		(kkg)		(percent)							
1. Wool scouring	Small	16.2	Commission	307.1	NA	NA	NA	NA	332.3	519.8	405.7
	Large	81.0	Commission	63.6	NA	NA	NA	NA	68.4	132.3	98.3
2. Wool finishing	Small	3.1	Integrated	53.0	64.5	125.4	83.6	81.8			
	Medium	18.6	Integrated	7.8	9.8	19.0	14.5	13.4			
	Large	57.3	Integrated	5.9	7.5	15.7	12.0	10.9			
3. (Omitted)											
4. Woven fabric finishing											
a. Simple processing	Small	2.4	Commission	593.6	642.9	1015.1	743.5	742.2			
			Own fabric	326.6	354.9	568.7	412.7	411.9			
			Integrated	48.5	52.9	89.9	61.9	61.8			
	Medium	12.3	Commission	97.2	120.2	234.3	160.4	155.4			
			Own fabric	35.5	42.4	78.1	53.6	52.3			
			Integrated	11.0	13.0	21.8	16.1	15.8			
	Large	49.3	Commission	15.0	18.7	34.2	26.3	24.8			
			Own fabric	10.0	12.5	22.9	17.6	16.6			
			Integrated	5.7	7.1	12.9	10.0	9.4			
b. Complex processing	Small	9.7	Commission	132.7	164.5	307.2	216.3	NA			
			Own fabric	43.7	52.5	98.4	67.3	NA			
			Integrated	14.1	16.6	27.7	20.5	NA			
	Medium	23.3	Commission	81.2	104.7	215.6	151.3	NA			
			Own fabric	27.3	33.3	57.8	44.0	NA			
			Integrated	9.3	11.4	19.6	15.0	NA			
	Large	116.3	Commission	15.4	19.6	40.9	31.5	NA			
			Own fabric	9.0	11.5	23.8	18.4	NA			
			Integrated	4.6	5.9	12.3	9.4	NA			
c. Desizing	Small	21.4	Commission	74.3	94.9	196.5	136.3	NA			
			Own fabric	32.2	39.3	69.8	51.9	NA			
			Integrated	10.8	13.1	22.7	17.4	NA			
	Medium	53.6	Commission	15.9	20.1	38.8	29.6	NA			
			Own fabric	11.4	14.4	27.8	21.2	NA			
			Integrated	6.7	8.4	16.3	12.4	NA			
	Large	178.5	Own fabric	8.7	11.0	24.5	18.7	NA			
			Integrated	4.8	6.0	13.4	10.2	NA			
5. Knit fabric finishing											
a. Simple processing	Small	1.6	Commission	241.2	264.3	433.1	309.7	309.4			
			Integrated	120.0	133.5	233.5	160.4	160.2			
	Medium	19.3	Commission	37.0	45.8	86.8	62.2	59.1			
			Integrated	10.9	13.4	23.1	17.6	16.8			

continued...

Table VIII-13. (Continued)

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (PSES) -- existing sources							
				B	D	F	H	J	M	N	P
		(kkg)		(percent)							
5. Knit fabric finishing (continued)											
a. Simple processing	Large	32.2	Commission	28.1	35.1	67.4	49.9	46.8			
			Integrated	6.5	8.1	14.8	11.4	10.7			
b. Complex processing	Small	7.7	Commission	61.4	75.3	144.1	97.1	94.5			
			Integrated	18.5	22.0	36.7	27.1	26.5			
	Medium	18.5	Commission	39.1	48.6	92.5	66.1	62.6			
			Integrated	11.4	14.0	24.2	18.4	17.6			
	Large	46.3	Commission	22.9	28.8	56.9	42.6	39.5			
			Integrated	5.0	6.3	12.2	9.4	8.7			
c. Hosiery products	Small	2.5	Own hosiery	103.7	114.6	203.1	137.6	137.4			
			Integrated	27.5	29.7	46.4	34.2	34.2			
	Medium	5.5	Own hosiery	18.6	21.0	42.3	24.6	24.4			
			Integrated	14.5	16.4	33.1	19.2	19.1			
	Large	12.6	Own hosiery	9.1	10.7	17.9	13.3	13.0			
			Integrated	7.6	9.0	15.0	11.1	10.9			
6. Carpet finishing	Small	8.9	Integrated	24.4	27.5	55.7	32.4	32.1			
	Medium	48.6	Integrated	16.9	20.7	35.8	27.3	26.0			
	Large	121.6	Integrated	12.6	15.8	30.6	23.3	21.6			
7. Stock & yarn finishing	Small	4.3	Commission	496.8	563.2	1168.9	666.7	663.2			
			Own yarn	93.4	109.9	273.8	137.0	136.1			
			Integrated	101.8	119.0	292.3	147.4	146.5			
	Medium	9.8	Commission	154.0	191.7	355.8	250.2	244.5			
			Own yarn	50.5	61.1	119.1	78.8	77.1			
			Integrated	48.4	58.9	110.6	75.4	73.9			
	Large	23.5	Commission	81.1	103.8	215.8	149.5	140.1			
			Own yarn	24.4	30.0	52.1	39.6	37.8			
			Integrated	24.4	30.0	51.9	39.5	37.7			
	X-Large	58.6	Own yarn	11.3	14.3	27.6	21.1	19.5			
			Integrated	16.2	20.5	39.6	30.2	28.0			
8. Nonwoven manufacturing	Small	10.4	N.A.	21.2	24.0	48.6	28.1	27.9			
	Medium	23.6	N.A.	11.7	13.8	23.1	17.1	16.7			
	Large	56.7	N.A.	5.4	6.6	11.4	8.7	8.3			
9. Felted fabric processing	Small	0.9	N.A.	22.6	24.5	38.1	28.1	NA			
	Medium	4.4	N.A.	37.3	44.0	79.7	55.1	NA			
	Large	10.7	N.A.	687.6	846.1	1477.0	1124.6	NA			

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

The effects of controls on the profitability of the large models are considerably less, except in the case of the large felted fabric model. It incurs losses under all alternatives. Under Alternatives B and D, the reductions of the returns of the large integrated models are generally less than 10 percent while those of the large commission models are generally under 30 percent.

b. Return on Total Assets

The 21-year average after-tax returns on total assets before and after PSES expenditures are shown in Table VIII-14. As was the case with the direct discharger models, the returns are considerably higher than the corresponding returns on sales because of the lower dollar amounts of assets compared to sales. The negative values of the returns on assets follow the same pattern as those of the returns on sales. The returns of the smallest commission model in each of the subcategories are negative for all alternatives. In addition to the small model in yarn finishing, the medium and large commission models in this subcategory have low returns or losses under PSES. Also in this subcategory, the small and medium own yarn models have extremely low to negative returns. Other small models with low or negative returns are the own fabric woven (simple) and the small integrated knit (simple) models.

The returns of the large models show appreciably less impact than those of the small. The returns of the large integrated models in most of the subcategories show reductions of less than 20 percent under most of the alternatives. However, large reductions are incurred by the large and X-large models in yarn finishing. The large model exhibiting the greatest reduction in returns on assets is the large felted fabric model. It incurs negative returns exceeding 30 percent under all alternatives.

c. Annual Cash Flows

As discussed above, annual cash flow is calculated by adding after-tax profits and depreciation. Cash flows calculated for year 21 for the existing models under baseline and PSES controls are shown in Table VIII-15. The impacts of PSES expenditures are considerably higher on the indirect dischargers than was the case of BAT on the direct discharger models. The flows of the smallest commission model in each of the subcategories are negative under all alternatives. Another model with negative cash flows under all alternatives is the small own fabric woven (simple) model. Under Alternative F, the cash flows of the small knit (simple) model and the small own and integrated yarn models are negative.

The reductions of cash flows of the large models are considerably less than those of the small. The reductions under Alternative F, are less than 10 percent for all large integrated models except those in yarn finishing and carpeting. The reductions for these models are about 35 and 20 percent, respectively. The reductions for the large commission models vary between 15 and 20 percent in the woven fabric subcategory and 35 and 40 percent in knit fabric.

Table VIII-14. The textile industry, representative existing model plant impacts, effects of wastewater control expenditures on average after-tax returns on total assets - indirect dischargers

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternatives (PSES) -- existing source							
					B	D	F	H	J	M1/	N1/	P1/
1. Wool scouring	Small	16.2	Commission	19.1	-30.9	NA	NA	NA	NA	-32.6	-53.7	-40.4
	Large	81.0	Commission	4.9	1.7	NA	NA	NA	NA	1.5	-1.2	0.2
2. Wool finishing	Small	3.1	Integrated	7.9	3.6	2.7	-1.1	1.4	1.5			
	Medium	18.6	Integrated	14.8	13.4	13.1	11.4	12.2	12.4			
	Large	57.3	Integrated	14.7	13.7	13.4	12.0	12.7	12.8			
3. (Omitted)												
4. Woven fabric finishing												
a. Simple processing	Small	2.4	Commission	6.2	-24.9	-26.2	-42.8	-30.9	-30.6			
			Own fabric	6.1	-12.8	-14.0	-25.2	-17.1	-16.9			
			Integrated	11.7	5.6	5.1	1.2	4.1	4.1			
	Medium	12.3	Commission	11.8	0.8	-1.3	-9.7	-5.2	-4.6			
			Own fabric	8.0	5.1	4.5	1.9	3.6	3.7			
			Integrated	14.5	12.7	12.3	10.6	11.8	11.9			
	Large	49.3	Commission	12.1	10.1	9.6	7.5	8.6	8.8			
			Own fabric	11.3	10.0	9.7	8.3	9.0	9.1			
			Integrated	16.3	15.2	14.9	13.6	14.3	14.4			
b. Complex processing	Small	9.7	Commission	11.6	-2.6	-5.5	-14.5	-10.3	NA			
			Own fabric	9.7	5.3	4.5	0.8	3.2	NA			
			Integrated	12.1	10.2	9.8	8.2	9.3	NA			
	Medium	23.3	Commission	7.8	1.6	0.1	-6.5	-3.0	NA			
			Own fabric	8.2	5.8	5.2	3.1	4.3	NA			
			Integrated	10.4	9.3	9.1	8.1	8.7	NA			
	Large	116.3	Commission	10.4	8.7	8.2	5.9	6.9	NA			
			Own fabric	11.0	9.9	9.5	8.0	8.7	NA			
			Integrated	14.7	13.9	13.7	12.5	13.1	NA			
c. Desizing	Small	21.4	Commission	11.4	3.0	1.0	-7.3	-2.7	NA			
			Own fabric	6.9	4.5	4.0	1.8	3.1	NA			
			Integrated	10.4	9.2	8.9	7.7	8.4	NA			
	Medium	53.6	Commission	19.1	15.6	14.6	10.5	12.6	NA			
			Own fabric	11.3	9.8	9.4	7.7	8.6	NA			
			Integrated	10.9	10.1	9.8	8.8	9.3	NA			
	Large	178.5	Own fabric	9.2	8.3	8.1	6.7	7.3	NA			
			Integrated	10.5	9.9	9.8	8.9	9.3	NA			

continued...

Table VIII-14. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternatives (PSES) -- existing source							
					B	D	F	H	J	M	N	P
5. Knit fabric finishing a. Simple processing	Small	1.6	Commission	13.4	-14.6	-16.4	-33.1	-21.0	-20.8			
			Integrated	9.7	-1.7	-2.9	-11.8	-5.3	-5.2			
	Medium	19.3	Commission	16.4	9.7	8.2	2.4	5.7	6.1			
			Integrated	8.7	7.7	7.4	6.5	7.0	7.1			
	Large	32.2	Commission	16.1	11.1	9.8	4.8	7.4	7.8			
			Integrated	12.0	11.0	10.8	9.9	10.4	10.5			
b. Complex processing	Small	7.7	Commission	8.5	3.3	2.2	-2.2	0.7	0.9			
			Integrated	10.1	8.0	7.6	5.9	7.1	7.1			
	Medium	18.5	Commission	16.4	9.4	7.7	1.7	5.2	5.6			
			Integrated	8.0	7.0	6.8	5.9	6.4	6.5			
	Large	46.3	Commission	16.0	11.9	10.8	6.2	8.5	8.9			
			Integrated	11.2	10.6	10.4	9.6	10.0	10.1			
c. Hosiery products	Small	2.5	Own hosiery	7.3	0.1	-0.6	-6.6	-2.1	-2.1			
			Integrated	7.1	5.0	4.8	3.5	4.4	4.4			
	Medium	5.5	Own hosiery	6.1	4.9	4.7	3.3	4.5	4.5			
			Integrated	22.0	18.1	17.5	13.7	16.8	16.8			
	Large	12.6	Own hosiery	8.1	7.3	7.1	6.4	6.9	6.9			
			Integrated	21.7	19.7	19.2	17.1	18.6	18.7			
6. Carpet finishing	Small	8.9	Integrated	9.9	7.2	6.9	4.1	6.4	6.4			
	Medium	48.6	Integrated	9.5	7.8	7.4	5.8	6.7	6.8			
	Large	121.6	Integrated	8.4	7.2	6.9	5.5	6.2	6.4			
7. Stock & yarn finishing	Small	4.3	Commission	18.7	-47.2	-49.3	-104.4	-58.0	-56.7			
			Own yarn	8.7	0.7	-0.6	-13.8	-2.7	-2.6			
			Integrated	12.3	0.4	-1.2	-19.4	-4.2	-4.0			
	Medium	9.8	Commission	16.3	-5.2	-9.2	-19.9	-15.6	-14.8			
			Own yarn	6.3	2.9	2.3	-0.7	1.3	1.4			
			Integrated	11.5	5.7	4.6	-0.1	2.9	3.1			
	Large	23.5	Commission	17.9	3.8	0.6	-11.5	-5.2	-3.9			
			Own yarn	9.7	7.1	6.5	4.2	5.6	5.7			
			Integrated	10.6	7.8	7.1	4.6	6.0	6.2			
	X-Large	58.6	Own yarn	13.2	11.6	11.1	9.1	10.1	10.3			
			Integrated	8.6	7.1	6.7	4.9	5.8	5.9			

continued...

Table VIII-14. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternatives (PSES) -- existing sources B	D	F	H	J	M	N	P
8. Nonwoven manufacturing	Small	10.4	NA	14.7	11.2	10.7	7.2	10.1	10.1			
	Medium	23.6	NA	10.7	9.3	9.1	7.9	8.7	8.7			
	Large	56.7	NA	13.8	12.9	12.7	11.9	12.4	12.4			
9. Felted fabric processing	Small	0.9	NA	13.0	9.7	9.4	7.6	8.9	NA			
	Medium	4.4	NA	7.3	4.4	3.8	1.4	3.0	NA			
	Large	10.7	NA	7.5	-33.7	-38.3	-47.8	-47.9	NA			

1/ Treatment alternatives M, N, and P apply to wool scouring only.

Table VIII-15. The textile industry, representative existing model plant impacts, effects of wastewater control expenditures on annual cash flows (year 21) - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (PSES) -- existing source							
					B	D	F	H	J	M1/	N1/	P1/
		(kkg)		($1,000)								
1. Wool scouring	Small	16.2	Commission	155	-203	NA	NA	NA	NA	-227	-466	-316
	Large	81.0	Commission	1,312	927	NA	NA	NA	NA	914	736	792
2. Wool finishing	Small	3.1	Integrated	872	623	586	460	517	527			
	Medium	18.6	Integrated	9,688	9,147	9,030	8.487	8,720	8,810			
	Large	57.3	Integrated	19,248	18,436	18,248	17,230	17,642	17,835			
3. (Omitted)												
4. Woven fabric finishing a. Simple processing	Small	2.4	Commission	95	-233	-254	-481	-316	-313			
			Own fabric	161	-140	-161	-387	-222	-220			
			Integrated	586	399	388	266	355	356			
	Medium	12.3	Commission	500	248	213	-1	110	131			
			Own fabric	1,341	1,090	1.054	928	984	996			
			Integrated	3,489	3,238	3,202	3,076	3,132	3,144			
	Large	49.3	Commission	4,941	4,504	4,414	4,037	4,204	4,260			
			Own fabric	7,054	6.617	6,526	6,150	6,317	6,372			
			Integrated	10,850	10,412	10,322	9,946	10,112	10,168			
b. Complex processing	Small	9.7	Commission	403	141	80	-161	-52	NA			
			Own fabric	1,053	800	765	638	694	NA			
			Integrated	2.824	2,571	2,536	2.410	2,465	NA			
	Medium	23.3	Commission	905	551	488	147	348	NA			
			Own fabric	2,159	1.805	1,742	1,499	1.608	NA			
			Integrated	6,381	6,028	5,964	5,721	5.830	NA			
	Large	116.3	Commission	9,349	8,530	8,344	7,326	7,737	NA			
			Own fabric	14,592	13,773	13,586	12,569	12,979	NA			
			Integrated	25.433	24,614	24,428	23.410	23,821	NA			
c. Desizing	Small	21.4	Commission	859	505	441	118	307	NA			
			Own fabric	1,887	1,533	1,469	1,227	1.336	NA			
			Integrated	5,506	5,152	5,088	4,845	4,955	NA			
	Medium	53.6	Commission	5.196	4,661	4,542	3,999	4,235	NA			
			Own fabric	7,663	7,128	7,009	6,466	6,702	NA			
			Integrated	12,264	11,729	11.610	11.067	11,303	NA			
	Large	178.5	Own fabric	22,761	21.570	21,309	19.628	20.292	NA			
			Integrated	37,978	36,787	36,526	34.845	35.509	NA			

continued...

Table VIII-15. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternative (PSES) -- existing source							
					B	D	F	H	J	M	N	P
5. Knit fabric finishing												
a. Simple processing	Small	1.6	Commission	190	-70	-92	-318	-153	-151			
			Integrated	312	110	90	-136	29	32			
	Medium	19.3	Commission	1,454	1,105	1,039	796	907	939			
			Integrated	5,625	5,275	5,210	4,967	5,078	5,110			
	Large	32.2	Commission	2,405	1,969	1,878	1,502	1,669	1,723			
			Integrated	10,158	9.722	9,631	9,255	9,422	9,477			
b. Complex processing	Small	7.7	Commission	815	564	527	401	458	470			
			Integrated	2,203	1.952	1,915	1,789	1.846	1,858			
	Medium	18.5	Commission	1.383	1,031	964	722	834	867			
			Integrated	5,493	5,141	5,074	4,832	4,944	4,977			
	Large	46.3	Commission	3,678	3,139	3,025	2.483	2,713	2,800			
			Integrated	16,392	15,852	15,739	15,196	15,426	15,514			
c. Hosiery products	Small	2.5	Own hosiery	421	233	222	20	179	181			
			Integrated	1,102	914	903	781	870	871			
	Medium	5.5	Own hosiery	1,611	1.401	1,381	1,116	1.338	1,342			
			Integrated	1,886	1,676	1,656	1,390	1,613	1,617			
	Large	12.6	Own hosiery	3,967	3,716	3,680	3.554	3,610	3,622			
			Integrated	4,375	4,124	4,088	3,962	4,018	4,030			
6. Carpet finishing	Small	8.9	Integrated	1.335	1,125	1,105	839	1.062	1,066			
	Medium	48.6	Integrated	3,515	3,163	3,098	2,856	2,966	2,999			
	Large	121.6	Integrated	7,012	6,472	6,356	5,813	6,046	6,134			
7. Stock & yarn finishing	Small	4.3	Commission	102	-252	-291	-784	-371	-365			
			Own yarn	435	227	205	-269	143	148			
			Integrated	403	194	172	-299	113	117			
	Medium	9.8	Commission	366	106	43	-199	-87	-69			
			Own yarn	868	618	502	456	513	523			
			Integrated	901	652	616	489	546	556			
	Large	23.5	Commission	751	401	335	-8	197	235			
			Own yarn	2,382	2,032	1,967	1.724	1,835	1,867			
			Integrated	1.874	1,524	1,459	1,216	1,327	1,359			
	X-Large	58.6	Own yarn	8,340	7,799	7,682	7,138	7,372	7,462			
			Integrated	4,393	3,853	3,735	3,192	3,426	3,515			

continued...

Table VIII-15. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternative (PSES) -- existing sources B	D	F	H	J	M	N	P
8. Nonwoven manufacturing	Small	10.4	NA	1,553	1,344	1,323	1,057	1,280	1,284			
	Medium	23.6	NA	3,795	3,543	3,507	3,380	3,438	3,449			
	Large	56.7	NA	9,933	9,581	9,516	9,272	9,384	9,418			
9. Felted fabric processing	Small	0.9	NA	1,194	1,007	995	873	962	NA			
	Medium	4.4	NA	1,186	933	897	771	827	NA			
	Large	10.7	NA	159	-499	-570	-1,026	-818	NA			

1/ Treatment alternatives M, N, and P apply to wool scouring only.

d. Net Present Values

The NPV's for the indirect discharger model plants are shown in Table VIII-16. A negative value indicates that the model should be considered as a closure or as a marginal operation. Two models have negative values under baseline: the large wool scouring and the small own fabric woven (simple) model. Model plants which had negative returns on sales under PSES also have negative NPV's. These include the small commission models in all subcategories and subdivisions as well as the small integrated models in wool, knit fabric and yarn finishing. The small own fabric woven models show negative or low NPV's in all of the subdivision. The NPV's of the small and medium own yarn models also are negative for all alternatives. In the felted fabric processing subcategory, both the medium and large models show negative or low NPV's under all PSES alternatives.

The NPV's of the large models generally remain substantial under all alternatives. An exception is the large commission yarn model which shows negative values under Alternatives F, H and J. The NPV's of the large integrated models in most of the subcategories are reduced less than 30 percent under Alternative F, the most expensive of the alternatives.

3. Production Effects

As discussed in the previous chapter, an estimated 928 wet processors (exclusive of greige operations) currently exist in the industry. Of this number only 15 percent or 141 plants required PSES controls. Projected closures under baseline and under PSES are discussed below.

a. Baseline Plant Closures

Of the estimated 141 indirect dischargers requiring PSES controls 16 plants are projected to close under baseline conditions (see Table VIII-17). As a result, an estimated 125 plants will be required to install PSES controls.

b. Expected Model Plant Closures

Projected plant closures resulting from various PSES alternatives are shown in Table VIII-18 and the number of actual plants that are estimated to close are shown by plant size and control alternatives in Table VIII-19.

Four alternatives (B,M,N and P) were considered for wool scouring and a total of 7 plant closures were forecasted for each of these alternatives. This represents all of the wool scouring plants that will be required to install controls under PSES. Because of the baseline economic conditions of the wool scouring plants and high estimated control costs for these plants, this segment is very severely affected under all of the alternatives considered.

Table VIII-16. The textile industry, representative existing model plant impacts, effects of wastewater control expenditures on net present values - indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (PSES) - existing sources							
					B	D	F	H	J	M 1/	N 1/	P 1/
		(kkg)		($1,000)								
1. Wool scouring	Small	16.2	Commission	327	-634	NA	NA	NA	NA	-699	-1,230	903
	Large	81.0	Commission	-400	-1,744	NA	NA	NA	NA	-1,809	-2,583	-2,255
2. Wool finishing	Small	3.1	Integrated	714	-169	-314	-895	-562	-532			
	Medium	18.6	Integrated	19,985	18,079	17,620	15,536	16,503	16,790			
	Large	57.3	Integrated	39,581	36,729	36,000	32,208	33,827	34,452			
3. (Omitted)												
4. Woven fabric finishing												
a. Simple processing	Small	2.4	Commission	118	-835	-905	-1,497	-1,065	-1,061			
			Own fabric	-19	-872	-935	-1,464	-1,078	-1,075			
			Integrated	1,292	632	585	172	473	476			
	Medium	12.3	Commission	649	-261	-410	-1,017	-665	-629			
			Own fabric	1,798	909	765	185	516	552			
			Integrated	5,485	4,597	4,453	3,873	4,204	4,239			
	Large	49.3	Commission	9,698	8,155	7,803	6,336	7,040	7,219			
			Own fabric	11,547	10,004	9,652	8,185	8,889	9,069			
			Integrated	13,043	11,500	11,148	9,681	10,386	10,565			
b. Complex processing	Small	9.7	Commission	549	-396	-549	-1,185	-814	NA			
			Own fabric	1,325	430	289	-291	38	NA			
			Integrated	4,089	3,195	3,053	2,473	2,802	NA			
	Medium	23.3	Commission	752	-497	-748	-1,737	-1,229	NA			
			Own fabric	2,379	1,130	878	-110	398	NA			
			Integrated	6,897	5,648	5,397	4,409	4,916	NA			
	Large	116.3	Commission	13,633	10,752	10,026	6,244	7,851	NA			
			Own fabric	18,728	15,848	15,122	11,340	12,947	NA			
			Integrated	26,687	23,806	23,080	19,298	20,905	NA			
c. Desizing	Small	21.4	Commission	681	-568	-819	-1,807	-1,300	NA			
			Own fabric	1,822	573	322	-666	-158	NA			
			Integrated	5,801	4,552	4,301	3,312	3,820	NA			
	Medium	53.6	Commission	12,658	10,766	10,304	8,220	9,193	NA			
			Own fabric	13,119	11,228	10,765	8,682	9,655	NA			
			Integrated	13,888	11,997	11,535	9,451	10,424	NA			
	Large	178.5	Own fabric	25,841	21,664	20,648	14,454	17,031	NA			
			Integrated	36,222	32,044	31,028	24,835	27,412	NA			
5. Knit fabric finishing												
a. Simple processing	Small	1.6	Commission	344	-449	-510	-1,002	-642	-640			
			Integrated	522	-167	-219	-650	-335	-333			
	Medium	19.3	Commission	2,711	1,475	1,218	230	743	844			
			Integrated	5,406	4,170	3,912	2,924	3,438	3,539			

continued . . .

1/ Treatment alternatives M, N, and P are applicable to wool scouring only.

Table VIII-16. (continued)

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (PSES) - existing sources B	D	F	H	J	M	N	P
		(kkg)		($1,000)								
5. Knit fabric finishing												
a. Simple processing (cont'd)												
	Large	32.2	Commission	4,189	2,649	2,297	831	1,535	1,711			
			Integrated	11,384	9,844	9,492	8,025	8,729	8,905			
b. Complex processing	Small	7.7	Commission	1,058	169	21	-559	-223	-188			
			Integrated	3,557	2,668	2,520	1,940	2,276	2,311			
	Medium	18.5	Commission	2,584	1,342	1,081	93	610	717			
			Integrated	5,238	3,996	3,736	2,748	3,264	3,372			
	Large	46.3	Commission	6,337	4,432	3,988	1,905	2,859	3,143			
			Integrated	15,222	13,317	12,873	10,790	11,744	12,027			
c. Hosiery products	Small	2.5	Own hosiery	399	-302	-353	-789	-471	-468			
			Integrated	380	-280	-327	-740	-439	-436			
	Medium	5.5	Own hosiery	939	199	115	-777	-34	-23			
			Integrated	4,236	3,495	3,411	2,519	3,263	3,273			
	Large	12.6	Own hosiery	3,489	2,600	2,456	1,876	2,207	2,242			
			Integrated	9,661	8,772	8,628	8,048	8,379	8,415			
6. Carpet finishing	Small	8.9	Integrated	2,672	1,931	1,847	955	1,699	1,709			
	Medium	48.6	Integrated	6,910	5,668	5,413	4,425	4,936	5,043			
	Large	121.6	Integrated	13,918	12,013	11,559	9,476	10,440	10,726			
7. Stock & yarn finishing	Small	4.3	Commission	218	-788	-906	-2,111	-1,108	-1,099			
			Own yarn	449	-296	-381	-1,281	-531	-524			
			Integrated	745	-24	-113	-1,037	-268	-260			
	Medium	9.8	Commission	807	-173	-340	-1,025	-614	-583			
			Own yarn	766	-117	-263	-843	-510	-480			
			Integrated	1,505	622	477	-104	229	259			
	Large	23.5	Commission	1,577	336	77	-919	-400	-298			
			Own yarn	3,285	2,049	1,791	803	1,317	1,418			
			Integrated	3,624	2,388	2,130	1,142	1,656	1,757			
	X-Large	58.6	Own yarn	16,639	14,733	14,274	12,190	13,157	13,444			
			Integrated	7,589	5,682	5,224	3,139	4,106	4,394			
8. Nonwoven manufacturing	Small	10.4	N.A.	2,588	1,817	1,732	840	1,585	1,595			
	Medium	23.6	N.A.	4,961	4,072	3,925	3,345	3,680	3,715			
	Large	56.7	N.A.	14,393	13,151	12,895	11,902	12,419	12,526			
9. Felted fabric processing	Small	0.9	N.A.	2,279	1,619	1,571	1,158	1,460	NA			
	Medium	4.4	N.A.	1,022	128	-15	-597	-265	NA			
	Large	10.7	N.A.	79	-1,557	-1,898	-3,231	-2,526	NA			

Table VIII-17. The textile industry, number of plants requiring PSES control after baseline closure - indirect dischargers

Subcategory	Size	Daily capacity (kkg)	Type plant	Total number of plants	Plants requiring controls (before baseline closures)	Baseline closures 1/	Plants requiring controls (after baseline closures)
1. Wool scouring	Small	16.2	Commission	7	5	-	5
	Large	81.0	Commission	3	2	-	2
2. Wool finishing	Small	3.1	Integrated	21	14	2	12
	Medium	18.6	Integrated	4	3	1	2
	Large	37.3	Integrated	1	1	-	1
3. (Omitted)							
4. Woven fabric finishing							
a. Simple processing	Small	2.4	Commission	19	-	-	-
			Own fabric	6	-	-	-
			Integrated	28	-	-	-
	Medium	12.3	Commission	32	-	-	-
			Own fabric	17	-	-	-
			Integrated	27	-	-	-
	Large	49.3	Commission	4	-	-	-
			Own fabric	6	-	-	-
			Integrated	17	-	-	-
b. Complex processing	Small	9.7	Commission	9	3	-	3
			Own fabric	3	1	-	1
			Integrated	11	4	-	4
	Medium	23.3	Commission	6	2	-	2
			Own fabric	6	2	-	2
			Integrated	5	2	-	2
	Large	116.3	Commission	2	1	-	1
			Own fabric	7	2	-	2
			Integrated	7	2		2
c. Desizing	Small	21.4	Commission	6	3	-	3
			Own fabric	5	3	-	3
			Integrated	6	3		3
	Medium	53.6	Commission	4	2	-	2
			Own fabric	5	2	-	2
			Integrated	1	1	-	1

continued . . . . .

Table VIII-17. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Total number of plants	Plants requiring controls (before baseline closures)	Baseline closures 1/	Plants requiring controls (after baseline closures)
4. Woven fabric finishing (continued)							
c. Desizing	Large	178.5	Own fabric	1	1	-	1
			Integrated	3	1	-	1
5. Knit fabric finishing							
a. Simple processing	Small	1.6	Commission	21	-	-	-
			Integrated	56	-	-	-
	Medium	19.3	Commission	20	-	-	-
			Integrated	59	-	-	-
	Large	32.2	Commission	4	-	-	-
			Integrated	25	-	-	-
b. Complex processing	Small	7.7	Commission	6	-	-	-
			Integrated	14	-	-	-
	Medium	18.5	Commission	3	-	-	-
			Integrated	12	-	-	-
	Large	46.3	Commission	1	-	-	-
			Integrated	11	-	-	-
c. Hosiery products	Small	2.5	Own hosiery	14	5	2	3
			Integrated	116	38	9	29
	Medium	5.5	Own hosiery	2	1	-	1
			Integrated	18	6	-	6
	Large	12.6	Own hosiery	1	-		-
			Integrated	2	1	-	1
6. Carpet finishing	Small	8.9	Integrated	17	-	-	-
	Medium	48.6	Integrated	23	-	-	-
	Large	121.6	Integrated	5	-	-	-
7. Stock & yarn finishing	Small	4.3	Commission	30	5	-	5
			Own yarn	18	3	-	3
			Integrated	44	7	-	7

continued . . . . .

Table VIII-17. (continued)

Subcategory	Size	Daily capacity (kkg)	Type plant	Total number of plants	Plants requiring controls (before baseline closures)	Baseline closures 1/	Plants requiring controls (after baseline closures)
7. Stock & yarn finishing (continued)	Medium	9.8	Commission	5	2	1	1
			Own yarn	14	2	1	1
			Integrated	27	4	-	4
	Large	23.5	Commission	2	1	-	1
			Own yarn	9	2	-	2
			Integrated	17	2	-	2
	X-Large	58.6	Own yarn	6	1	-	1
			Integrated	6	1	-	1
8. Nonwoven manufacturing	Small	10.4	N.A.	18	-	-	-
	Medium	23.6	N.A.	6	-	-	-
	Large	56.7	N.A.	2	-	-	-
9. Felted fabric processing	Small	0.9	N.A.	5	-	-	-
	Medium	4.4	N.A.	8	-		-
	Large	10.7	N.A.	2	-		-
			TOTAL	928	141	16	125

1/ Exclude baseline closures of those plants which do not require controls.

Table VIII-18. The textile industry, representative existing model plant impacts 1/, projected closures attributable to expenditures for wastewater control-indirect dischargers

Subcategory	Size	Daily Capacity	Type Plant	Baseline	Treatment alternatives (PSES) 2/ - existing sources B	D	F	H	J	M 2/	N 2/	P 2/
		(kkg)										
1. Wool scouring	Small	16.2	Commission		C	NA	NA	NA	NA	C	C	C
	Large	81.0	Commission	M	C	NA	NA	NA	NA	C	C	C
2. Wool finishing	Small	3.1	Integrated		M	M	C	C	C			
	Medium	18.6	Integrated									
	Large	57.3	Integrated									
3. (Omitted)												
4. Woven fabric finishing												
a. Simple processing	Small	2.4	Commission		C	C	C	C	C			
			Own fabric	M	C	C	C	C				
			Integrated									
	Medium	12.3	Commission		C	C	C	C	C			
			Own fabric									
			Integrated									
	Large	49.3	Commission									
			Own fabric									
			Integrated									
b. Complex processing	Small	9.7	Commission		C	C	C	C	NA			
			Own fabric				M		NA			
			Integrated						NA			
	Medium	23.3	Commission		M	C	C	C	NA			
			Own fabric				M		NA			
			Integrated						NA			
	Large	116.3	Commission						NA			
			Own fabric						NA			
			Integrated						NA			
c. Desizing	Small	21.4	Commission		C	C	C	C	NA			
			Own fabric				M	M	NA			
			Integrated						NA			
	Medium	53.6	Commission						NA			
			Own fabric						NA			
			Integrated						NA			
	Large	178.5	Own fabric						NA			
			Integrated						NA			
5. Knit fabric finishing												
a. Simple processing	Small	1.6	Commission		C	C	C	C	C			
			Integrated		C	C	C	C	C			
	Medium	19.3	Commission									
			Integrated									
	Large	32.2	Commission				C	M	M			
			Integrated									
b. Complex processing	Small	7.7	Commission									
			Integrated									
	Medium	18.5	Commission									
			Integrated									
	Large	46.3	Commission									
			Integrated									

Continued.....

Table VIII-18. (Continued)

Subcategory	Size	Daily Capacity (kkg)	Type Plant	Baseline	Treatment alternatives (PSES) 2/ - existing sources B	D	F	H	J	M 2/	N 2/	P 2/
5. Knit fabric finishing (continued)												
c. Hosiery products	Small	2.5	Own hosiery		C	C	C	C	C			
			Integrated		M	M	M	M	M			
	Medium	5.5	Own hosiery				M					
			Integrated									
	Large	12.6	Own hosiery									
			Integrated									
6. Carpet finishing	Small	8.9	Integrated									
	Medium	48.6	Integrated									
	Large	121.6	Integrated									
7. Stock & yarn finishing	Small	4.3	Commission		C	C	C	C	C			
			Own yarn		C	C	C	C	C			
			Integrated		M	M	C	C	C			
	Medium	9.8	Commission		C	C	C	C	C			
			Own yarn		M	M	C	M	M			
			Integrated				M					
	Large	23.5	Commission				C	C	C			
			Own yarn									
			Integrated									
	X-Large	58.6	Own yarn									
			Integrated									
8. Nonwoven manufacturing	Small	10.4	NA									
	Medium	23.6	NA									
	Large	56.7	NA									
9. Felted fabric processing	Small	0.9	NA						NA			
	Medium	4.4	NA			M	M	M	NA			
	Large	10.7	NA		C	C	C	C	NA			

1/ Treatment alternatives for which model plants are projected to close are designated with letter "C", letter "M" designates marginal operations.

2/ Treatment Alternatives M, N and P are applicable to wool scouring, only.

Table VIII-19. The textile industry, projected plant closures based on NPV analysis of representative model plants - indirect dischargers.

Subcategory	Size	Daily capacity	Type plant	Number of plants requiring controls (after baseline closures)	Treatment alternatives (PSES) -- existing sources							
					B	D	F	H	J	M[1/]	N[1/]	P[1/]
		(kkg)										
1. Wool scouring	Small	16.2	Commission	5	5					5	5	5
	Large	81.0	Commission	2	2					2	2	2
2. Wool finishing	Small	3.1	Integrated	12	6	6	12	12	12			
	Medium	18.6	Integrated	2								
	Large	57.3	Integrated	1								
3. (Omitted)												
4. Woven fabric finishing												
a. Simple processing	Small	2.4	Commission									
			Own fabric									
			Integrated									
	Medium	12.3	Commission									
			Own fabric									
			Integrated									
	Large	49.3	Commission									
			Own fabric									
			Integrated									
b. Complex processing	Small	9.7	Commission	3	3	3	3	3				
			Own fabric	1								
			Integrated	4								
	Medium	23.3	Commission	2	1	2	2	2				
			Own fabric	2			1					
			Integrated	2								
	Large	116.3	Commission	1								
			Own fabric	2								
			Integrated	2								
c. Desizing	Small	21.4	Commission	3	3	3	3	3				
			Own fabric	3			2	2				
			Integrated	3								
	Medium	53.6	Commission	2								
			Own fabric	2								
			Integrated	1								
	Large	178.5	Own fabric	1								
			Integrated	1								
5. Knit fabric finishing												
a. Simple processing	Small	1.6	Commission									
			Integrated									
	Medium	19.3	Commission									
			Integrated									

continued...

Table VIII-19. (continued)

Subcategory	Size	Daily capacity	Type plant	Number of plants requiring controls (after baseline closures)	Treatment alternatives (PSES) -- existing sources							
		(kkg)			B	D	F	H	J	M1/	N1/	P1/
5. Knit fabric finishing (continued)												
a. Simple processing	Large	32.2	Commission									
			Integrated									
b. Complex processing	Small	7.7	Commission									
			Integrated									
	Medium	18.5	Commission									
			Integrated									
	Large	46.3	Commission									
			Integrated									
c. Hosiery products	Small	2.5	Own hosiery	3	3	3	3	3	3			
			Integrated	29	15	15	15	15	15			
	Medium	5.5	Own hosiery	1			1	1	1			
			Integrated	6								
	Large	12.6	Own hosiery									
			Integrated	1								
6. Carpet finishing	Small	8.9	Integrated									
	Medium	48.6	Integrated									
	Large	121.6	Integrated									
7. Stock & yarn finishing	Small	4.3	Commission	5	5	5	5	5	5			
			Own yarn	3	3	3	3	3	3			
			Integrated	7	4	4	7	7	7			
	Medium	9.8	Commission	1	1	1	1	1	1			
			Own yarn	1	1	1	1	1	1			
			Integrated	4			4					
	Large	23.5	Commission	1			1	1	1			
			Own yarn	2								
			Integrated	2								
	X-Large	58.6	Own yarn	1								
			Integrated	1								
8. Nonwoven manufacturing	Small	10.4	N.A.									
	Medium	23.6	N.A.									
	Large	56.7	N.A.									
9. Felted fabric processing	Small	0.9	N.A.									
	Medium	4.4	N.A.									
	Large	10.7	N.A.									
			TOTALS	125	52	46	64	59	37	7	7	7

1/ Treatment alternative M, N, and P are applicable to wool scouring only.

Five control alternatives (B,D,F,H and J) were considered for the remainder of the subcategories covering a total of 118 plants (125-7 = 118). The number of segments in the industry that are expected to have severe impacts (from Table VIII-18) and the estimated number of plant closures (from Table VIII-19) are summarized below.

Impact Summary (Excluding Wool Scouring) - Indirect Dischargers

Alternative		No. of problem segments	No. of plant closures
B	Chemical coagulation & sedimentation	19	45
D	B plus multi media filtration	18	46
F	D plus granular activated carbon	25	64
H	B plus ozonation	21	59
J	Multi media filtration and ozonation	14	37

Under Alternative B, 14 models are projected as closures and 5 as marginal operations. The closures include 3 models in woven-simple, 1 in woven (complex), 1 in woven (desizing), 2 in knit fabric (simple), 1 in hosiery products, 3 in yarn finishing, and 1 in felted fabric. Marginal operations of models under Alternative B include 1 in wool finishing, 1 in woven (complex), 1 in hosiery products, and 2 in yarn finishing.

A similar pattern exists for Alternative D, however, one additional model is projected as a closure in woven fabric finishing. Five model plants are projected as marginal under Alternative D.

The largest number of model closures are projected under Alternative F for a total of 18. Under that alternative 7 models are projected as marginal. The estimated number of plants that are expected to close under the various alternative is shown on Table VIII-19 and summarized below for Alternative B and D.

Expected Plant Closures - Indirect Dischargers

Subcategory	Size	Type Plant	Treatment Alternatives - PSES B (Option 2)	D (Option 3)
Wool scouring	Small	Commission	5	NA
	Large	Commission	2	NA
Wool finishing	Small	Integrated	6	6
Woven fabric finishing				
- Complex	Small	Commission	3	3
	Medium	Commission	1	2
- Desizing	Small	Commission	3	3
Knit fabric finishing				
- Hosiery products	Small	Own hosiery	3	3
		Integrated	15	15
Stock & yarn finishing	Small	Commission	5	5
		Own yarn	3	3
		Integrated	4	4
	Medium	Commission	1	1
		Own yarn	1	1
		Total	52	46

4. Effects of Combining RCRA Costs with PSES

In the analysis of the effects of pollution control on the indirect dischargers, the imposition of RCRA was considered first, by itself and, second, in combination with the PSES treatment alternatives. As in the case of the direct dischargers, the effects of RCRA on the indirect dischargers is relatively minor. When RCRA costs are incorporated into the model plant profiles, the return on sales generally are reduced no more than one tenth of a percentage point (two models, the small commission woven-simple and small commission yarn show reductions of about four-tenths of a percentage point). The changes are similarly minor when RCRA costs are combined with the PSES alternatives of the small plants. Table VIII-20 illustrates the effects of RCRA costs on the model plants both under RCRA, only, and under the combined costs of RCRA and PSES. The imposition of RCRA in the medium and large plants generally did not result in any changes in return on sales. In the NPV analysis, no changes in model plant closures or marginal operations are identified. Consequently, no additional closures are projected solely with the implementation of RCRA.

Table VIII-20. The textile industry, the impact of RCRA expenditures on the returns on sales of small model plants (comparison of impacts of PSES and RCRA combined with PSES)1/ - indirect dischargers

Subcategory	Daily capacity	Type plant	Baseline		RCRA only	Treatment alternatives (PSES) -- existing sources.							
						B	D	F	H	J	M2/	N2/	P2/
	(kkg)					(percent)							
1. Wool scouring	16.2	Commission	3.6	PSES		-7.4	NA	NA	NA	NA	-8.3	-15.0	-10.9
				PSES & RCRA	3.5	-7.5	NA	NA	NA	NA	-8.4	-15.1	-11.0
2. Wool finishing	3.1	Integrated	1.9	PSES		0.9	0.7	-0.5	0.3	0.3			
				PSES & RCRA	1.8	0.8	0.6	-0.5	0.3	0.3			
3. (Omitted)													
4. Woven fabric finishing a. Simple processing	2.4	Commission	1.9	PSES		-9.6	-10.5	-17.7	-12.5	-12.4			
				PSES & RCRA	1.5	-10.1	-11.1	-18.3	-13.1	-13.0			
		Own fabric	1.1	PSES		-2.6	-2.9	-5.3	-3.5	-3.5			
				PSES & RCRA	1.0	-2.8	-3.1	-5.5	-3.7	-3.7			
		Integrated	2.5	PSES		1.3	1.2	0.2	0.9	0.9			
				PSES & RCRA	2.4	1.2	1.1	0.2	0.9	0.9			
b. Complex processing	9.7	Commission	2.5	PSES		-0.8	-1.6	-5.2	-2.9	NA			
				PSES & RCRA	2.4	-1.0	-1.8	-5.4	-3.1	NA			
		Own fabric	1.8	PSES		1.0	0.8	0.0	0.6	NA			
				PSES & RCRA	1.7	1.0	0.8	0.0	0.5	NA			
		Integrated	2.6	PSES		2.2	2.2	1.9	2.1	NA			
				PSES & RCRA	2.6	2.2	2.2	1.9	2.1	NA			
c. Desizing	21.4	Commission	2.4	PSES		0.6	0.1	-2.3	-0.9	NA			
				PSES & RCRA	2.3	0.6	0.1	-2.4	-0.9	NA			
		Own fabric	1.5	PSES		1.0	0.9	0.4	0.7	NA			
				PSES & RCRA	1.5	1.0	0.9	0.4	0.7	NA			
		Integrated	2.7	PSES		2.4	2.3	2.1	2.2	NA			
				PSES & RCRA	2.7	2.4	2.3	2.1	2.2	NA			
5. Knit fabric finishing a. Simple processing	1.6	Commission	3.2	PSES		-4.6	-5.3	-10.8	-6.8	-6.8			
				PSES & RCRA	2.9	-5.0	-5.8	-11.2	-7.2	-7.2			
		Integrated	2.0	PSES		-0.4	-0.7	-2.7	-1.2	-1.2			
				PSES & RCRA	1.9	-0.6	-0.8	-2.9	-1.4	-1.4			
b. Complex processing	7.7	Commission	2.6	PSES		1.0	0.6	-1.1	0.1	0.1			
				PSES & RCRA	2.5	1.0	0.6	-1.2	0.0	0.1			
		Integrated	2.5	PSES		2.0	1.9	1.6	1.8	1.8			
				PSES & RCRA	2.5	2.0	1.9	1.5	1.8	1.8			
c. Hosiery products	2.5	Own hosiery	1.2	PSES		0.0	-0.2	-1.2	-0.4	-0.4			
				PSES & RCRA	1.1	-0.1	-013	-1.3	-0.5	-0.5			
		Integrated	1.9	PSES		1.4	1.3	1.0	1.2	1.2			
				PSES & RCRA	1.8	1.3	1.3	1.0	1.2	1.2			
6. Carpet finishing	8.9	Integrated	2.4	PSES		1.8	1.8	1.1	1.6	1.6			
				PSES & RCRA	2.4	1.8	1.7	1.0	1.6	1.6			

continued...

Table VIII-20. (continued)

Subcategory	Daily capacity	Type plant	Baseline		RCRA only	Treatment alternatives (PSES) -- existing sources B	D	F	H	J	M	N	P
	(kkg)		-----(percent)-----										
7. Stock & yarn finishing	4.3	Commission	2.4	PSES		-9.7	-11.3	-26.2	-13.9	-13.8			
				PSES & RCRA	2.0	-10.3	-11.9	-26.8	-14.4	-14.4			
		Own yarn	1.8	PSES		0.1	-0.2	-3.1	-0.7	-0.6			
				PSES & RCRA	1.7	0.0	-0.3	-3.2	-0.8	-0.8			
		Integrated	2.1	PSES		0.0	-0.4	-4.1	-1.0	-1.0			
				PSES & RCRA	2.1	-0.2	-0.5	-4.3	-1.2	-1.1			
8. Nonwoven manufacturing	10.4	NA	2.6	PSES		2.0	1.9	1.3	1.8	1.8			
				PSES & RCRA	2.5	2.0	1.9	1.3	1.8	1.8			
9. Felted fabric processing	0.9	NA	5.3	PSES		4.1	4.0	3.3	3.8	NA			
				PSES & RCRA	5.3	4.1	4.0	3.2	3.8	NA			

1/ Two lines are shown for each model plant. The first line shows the return for PSES only; the second line shows only those returns for PSES & RCRA.

2/ Treatment alternatives M, N, and P are applicable to wool scouring only.

D. Impacts Under Recommended Options - BAT and PSES

After consideration of the various alternatives, EPA has tentatively decided upon recommended options for each subcategory. The recommended options are:

Recommended Options - BAT

Subcategory	Option	Technology	Description
1. Wool scouring	2	C	Biological treatment plus multimedia filtration
2. Wool finishing	4	D	Chemical coagulation sedimentation & multimedia filtration
4. Woven fabric finishing	2	C	Biological treatment plus multimedia filtration
5. Knit fabric finishing	2	C	Biological treatment plus multimedia filtration
6. Carpet finishing	2	C	Biological treatment plus multimedia filtration
7. Stock & yarn finishing	2	C	Biological treatment plus multimedia filtration
8. Nonwoven manufacturing	2	C	Biological treatment plus multimedia filtration
9. Felted fabric processing	1	A	Biological treatment (extended aeration & activated sludge)

Recommended Option - PSES

Subcategory	Option	Technology	Description
All	2	B	Chemical coagulation and sedimentation

1. Expected Price Increases

The textile industry consists of numerous subcategories which supply their goods both to common and specialized markets. Competition within most subcategories is relatively strong with excess capacity in most segments. The industry has encountered notable competition from imported textile goods. It has consistently earned relatively low profit margins, with profits being approximately one-half those of a composite of all manufacturing industries. Prices of textile goods have increased during the past decade, but these prices have increased at a rate considerably less than the rates for most industrial goods.

In the assessment of the expected price increases which can be associated with the imposition of wastewater control requirements, the above factors exert considerable influence. Furthermore, as was presented in the applicable tables, the required price increases for the models were not equal; thus some plants will require considerably higher price increases than others. As was discussed in Chapter V, Prices, the industry is very competitive with prices being determined typically by supply and demand relationships. If firms competing on common markets require different price increases, then it would be unlikely the firms with the higher required price increases could increase their respective prices by the required amount and still be able to compete with those firms requiring smaller price increases, particularly when the firms requiring the smaller increases are the high volume firms. Accordingly, it would be logical that prices would not increase by amounts in excess of the lower required price increases within a given segment. However, competition from non-regulated foreign textile goods producers may further limit the abilities of domestic textile firms to increase prices.

Furthermore, as was discussed in Chapter VII, Discharge Status, many plants in the industry will not be required to make wastewater control expenditures. This further contributes to the lack of uniformity of required price increases among the industry facilities. In summary, it is anticipated the textile industry will be limited in its ability to increase prices to recoup expenditures for wastewater controls. While within some subcategories (particularly those with little foreign competition and uniform control expenditure requirements) small price increases may occur, the overall ability of the industry to increase prices is expected to be limited.

2. Financial Effects of Recommended Options

The required price increases and financial effects for the recommended options are summarized in Table VIII-21 and Table VIII-22 for BAT and PSES, respectively.

a. BAT. Under BAT recommended options, price increases required by the direct dischargers range from a low of less than a tenth of a percent for the large integrated knit fabric model (simple processing) to 1.3 percent for the small commission stock and yarn model. Except for the complex processing and desizing models in woven fabric finishing, the increases required by the small commission models are one percent or higher for all subcategories. The increases required by the small complex processing and desizing models are 0.7 and 0.4 percent respectively. Price increases required for the large integrated models are 0.1 percent in most of the subcategories. The highest increase required by a large integrated model is 0.3 percent for the large wool finishing model. The increases required by the own fabric models generally fall between those of the commission and integrated models within the respective size categories.

Under the recommended options (BAT), returns on sales vary from a low of -6.0 percent for the small wool scouring model to over 4 percent for the small felted fabric processing model. In addition to the small wool scouring model, two other models have negative returns - the medium wool scouring model and the small commission woven fabric (simple) model. Except as indicated above for the wool scouring model, most of the small commission models have returns of about 1.5 percent. In woven fabric finishing, the smallest own fabric model has a return of 0.4 percent while the small own yarn model has a slightly higher return of 0.8 percent. The

Table VIII-21. The textile industry, summary of representative existing model plant impacts resulting from BAT recommended options 1/ -- direct dischargers

Subcategory	Size	Daily capacity	Type plant	Price increase required	Return on Sales		Return on Assets		Cash Flow		Net Present Value	
					Baseline	After controls	Baseline	After controls	Baseline	After controls	Baseline	After controls
		(kkg)		(%)	(%)	(%)	(%)	(%)	($1,000)			
1. Wool scouring	Small	16.2	Commission	1.0	-3.4	-6.0	-12.0	-21.0	-87	-249	928	-1,661
	Medium	35.6	Commission	0.6	0.4	-0.9	1.2	- 1.8	356	231	1,286	-1,728
	Large	81.0	Commission	0.4	1.9	1.5	4.7	3.7	1,438	1,320	1,750	-1,664
2. Wool finishing	Small	7.4	Integrated	0.7	1.6	1.0	8.6	5.0	1,714	1,332	503	- 861
	Medium	18.6	Integrated	0.5	1.2	0.7	9.4	5.7	2,865	2,259	3,525	1,368
	Large	37.3	Integrated	0.3	3.7	3.4	14.7	13.6	19,248	18,335	39,581	36,333
3. (Omitted)												
4. Woven fabric finishing												
a. Simple processing	Small	5.4	Commission	1.0	1.8	-0.4	9.0	-1.6	182	68	339	- 85
			Own fabric	0.3	1.0	0.4	5.2	2.0	330	232	- 62	- 433
			Integrated	0.3	2.3	2.0	9.8	8.5	1,267	1,169	2,005	1,660
	Medium	29.6	Commission	0.6	2.1	1.6	7.6	5.7	1,319	1,156	1,026	440
			Own fabric	0.2	1.5	1.3	6.9	6.1	2,793	2,630	2,408	1,823
			Integrated	0.1	2.7	2.6	11.1	10.6	7,566	7,404	9,503	8,918
	Large	73.9	Commission	0.4	4.1	3.8	14.6	13.3	5,484	5,245	10,768	9,898
			Integrated	0.1	3.1	3.0	15.8	15.4	16,317	16,078	21,553	20,683
b. Complex processing	Small	23.3	Commission	0.7	2.2	1.5	7.7	5.2	1,042	876	693	98
			Integrated	0.1	2.7	2.5	10.4	9.9	6,381	6,216	7,061	6,467
	Medium	116.3	Commission	0.3	2.0	1.8	7.4	6.4	5,824	5,482	3,157	1,904
			Own fabric	0.1	2.0	1.9	9.8	9.4	14,732	14,390	17,183	15,930
			Integrated	0.1	3.0	3.0	11.7	11.4	24,522	24,179	20,369	29,115
	Large	193.8	Integrated	0.1	3.0	3.0	11.7	11.5	50,036	49,589	52,781	51,136
c. Desizing	Small	21.4	Commission	0.8	2.4	1.6	11.3	7.5	926	760	723	128
			Own fabric	0.2	1.5	1.3	7.0	5.8	2,014	1,849	1,688	1,093
			Integrated	0.1	2.7	2.6	12.4	11.7	5,773	5,607	7,702	7,108
	Medium	53.6	Commission	0.4	4.2	3.9	19.1	17.3	5,196	4,951	12,658	11,769
			Own fabric	0.2	2.4	2.3	11.3	10.6	7,663	7,418	11,632	10,744
			Integrated	0.1	3.1	3.0	15.8	15.2	11,808	11,564	17,878	16,990
	Large	178.5	Own fabric	0.1	2.0	1.9	9.2	8.8	22,761	22,313	20,687	19,043
			Integrated	0.1	3.1	3.0	13.6	13.1	25,995	25,548	28,450	26,806

Continued.....

Table VIII-21. (Continued)

Subcategory	Size	Daily capacity	Type plant	Price increase required	Return on Sales		Return on Assets		Cash Flow		Net Present Value	
					Baseline	After controls	Baseline	After controls	Baseline	After controls	Baseline	After controls
		(kkg)		(%)	(%)	(%)	(%)	(%)	($1,000)			
5. Knit fabric finishing												
a. Simple processing	Small	8.0	Commission	1.1	2.7	1.6	8.8	5.0	559	442	772	343
			Integrated	0.2	2.5	2.3	10.7	9.6	2,259	2,142	3,881	3,463
	Medium	32.2	Commission	0.6	3.8	3.3	16.1	13.6	2,405	2,205	4,396	3,673
			Integrated	0.1	2.9	2.8	12.0	11.6	11,266	11,066	16,485	15,763
	Large	160.8	Commission	0.3	3.7	3.5	15.8	14.7	12,737	12,294	21,615	19,984
			Integrated	0.0	2.9	2.8	11.9	11.7	53,177	52,734	58,979	57,348
b. Complex processing	Small	7.7	Commission	1.2	2.7	1.5	8.8	4.9	543	425	753	319
			Integrated	0.2	2.5	2.3	10.1	9.2	2,476	2,358	3,982	3,558
	Medium	18.5	Integrated	0.1	1.0	1.9	8.0	7.5	5,492	5,327	5,238	4,644
	Large	30.9	Commission	0.6	3.8	3.3	16.2	13.7	2,457	2,253	4,319	3,583
			Integrated	0.1	2.9	2.8	11.3	10.9	10,884	10,681	10,157	9,422
c. Hosiery products	Small	2.5	Own hosiery	0.3	0.8	0.0	9.2	-0.4	165	61	143	-225
			Integrated	0.2	3.0	2.7	9.2	8.5	1,957	1,870	1,646	1,343
	Medium	5.5	Own hosiery	0.2	2.0	1.8	9.2	8.3	1,592	1,493	1,531	1,183
6. Carpet finishing	Small	20.2	Integrated	0.2	2.4	2.2	9.7	9.0	3,059	2,941	5,956	5,532
	Medium	48.6	Integrated	0.1	2.1	2.0	14.7	13.9	5,621	5,455	13,602	13,007
	Large	121.5	Integrated	0.1	2.7	2.6	11.0	10.4	9,270	9,025	21,266	20,378
7. Stock & yarn finishing	Small	9.8	Commission	1.3	2.1	0.5	10.9	3.3	355	238	470	- 10
			Own yarn	0.2	1.0	0.8	6.4	5.0	1,052	935	-235	-654
			Integrated	0.5	2.0	1.5	11.6	8.6	901	784	1,505	1,087
	Medium	23.5	Own yarn	0.3	2.3	2.0	9.0	7.8	2,407	2,244	2,929	2,343
			Integrated	0.2	2.2	2.0	10.6	9.4	2,282	2,119	4,292	3,707
	Large	39.1	Own yarn	0.4	2.3	2.1	8.9	8.0	4,029	3,829	4,806	4,083
			Integrated	0.2	2.6	2.5	10.0	9.5	7,852	7,662	11,051	10,329
	X-Large	58.6	Integrated	0.1	2.6	2.5	10.0	9.6	11,741	11,502	16,435	15,565
8. Nonwoven manufacturing	Small	10.4	N.A.	0.3	2.6	2.2	14.4	12.3	1,209	1,111	2,281	1,934
	Medium	23.6	N.A.	0.1	2.3	2.1	7.3	6.8	3,102	2,984	6,052	5,628
9. Felted fabric processing	Small	0.9	N.A.	1.1	5.3	4.3	13.0	10.2	1,194	1,042	2,279	1,739
	Medium	2.0	N.A.	0.8	2.6	1.7	6.6	4.2	1,039	856	1,212	556

1/ Option 2 (Alternative C) is recommended option for all subcategories, except wool finishing and felted fabric processing. Recommended options for wool finishing and felted fabric are options 4 and 1, respectively.

Table VIII-22. The textile industry, summary of representative existing model plant impacts resulting from PSES recommended options 1/ -- indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Price increase required	Return on Sales		Return on Assets		Cash Flow		Net Present Value	
					Baseline	After controls	Baseline	After controls	Baseline	After controls	Baseline	After controls
		(kkg)		(%)	(%)	(%)	(%)	(%)	($1,000)			
1. Wool scouring	Small	16.2	Commission	3.9	3.6	-7.4	19.1	-30.9	155	-203	327	-634
	Large	81.0	Commission	1.0	2.0	0.7	4.9	1.7	1,312	927	-400	-1,744
2. Wool finishing	Small	3.1	Integrated	1.0	1.9	0.9	7.9	3.6	872	623	714	-169
	Medium	18.6	Integrated	0.3	3.7	3.4	14.8	13.4	9,688	9,147	19,985	18,079
	Large	57.3	Integrated	0.2	3.7	3.4	14.7	13.7	19,248	18,436	39,581	36,729
3. (Omitted)												
4. Woven fabric finishing												
a. Simple processing	Small	2.4	Commission	4.8	1.9	-9.6	6.2	-24.9	95	-233	118	-835
			Own fabric	1.4	1.1	-2.6	6.1	-12.8	161	-140	-19	-872
			Integrated	1.2	2.5	1.3	11.7	5.6	586	399	1,292	632
	Medium	12.3	Commission	1.2	2.5	0.1	11.8	0.8	500	248	649	-261
			Own fabric	0.6	1.7	1.1	8.0	5.1	1,341	1,090	1,798	909
			Integrated	0.3	2.6	2.3	14.5	12.7	3,489	3,238	5,485	4,597
	Large	49.3	Commission	0.6	4.0	3.4	12.1	10.1	4,941	4,504	9,698	8,155
			Own fabric	0.2	2.4	2.2	11.3	10.0	7,054	6,617	11,547	10,004
			Integrated	0.2	3.1	2.9	16.3	15.2	10,850	10,412	13,043	11,500
b. Complex processing	Small	9.7	Commission	1.5	2.5	-0.8	11.6	-2.6	403	141	549	-396
			Own fabric	0.8	1.8	1.0	9.7	5.3	1,053	800	1,325	430
			Integrated	0.4	2.6	2.2	12.1	10.2	2.824	2,571	4,089	3,195
	Medium	23.3	Commission	1.1	2.2	0.4	7.8	1.6	905	551	752	-497
			Own fabric	0.4	1.5	1.1	8.2	5.8	2,159	1,805	2,379	1,130
			Integrated	0.2	2.7	2.4	10.4	9.3	6,381	6,028	6,897	5,648
	Large	116.3	Commission	0.4	2.9	2.4	10.4	8.7	9,349	8,530	13,633	10,752
			Own fabric	0.2	2.0	1.9	11.0	9.9	14,592	13,773	18,728	15,848
			Integrated	0.1	3.1	3.0	14.7	13.9	25,433	24,164	26,687	23,806
c. Desizing	Small	21.4	Commission	1.2	2.4	0.6	11.4	3.0	859	505	681	-568
			Own fabric	0.5	1.5	1.0	6.9	4.5	1,887	1,533	1,822	573
			Integrated	0.3	2.7	2.4	10.4	9.2	5,506	5,152	5,801	4,552
	Medium	53.6	Commission	0.7	4.2	3.6	19.1	15.6	5,196	4,661	12,658	10,766
			Own fabric	0.3	2.4	2.1	11.3	9.8	7,663	7,128	13,119	11,228
			Integrated	0.2	3.0	2.8	10.9	10.1	12,264	11,729	13,888	11,997
	Large	178.5	Own fabric	0.2	2.0	1.8	9.2	8.3	22,761	21,570	25,841	21,664
			Integrated	0.1	3.0	2.9	10.5	9.9	37,978	36,787	36,222	32,044

Continued.....

Table VIII-22. (Continued)

Subcategory	Size	Daily capacity	Type plant	Price increase required	Return on Sales		Return on Assets		Cash Flow		Net Present Value	
					Baseline	After controls	Baseline	After controls	Baseline	After controls	Baseline	After controls
		(kkg)		(%)	(%)	(%)	(%)	(%)	($1,000)			
5. Knit fabric finishing	Small	1.6	Commission	3.2	3.2	-4.6	13.4	-14.6	190	-70	344	-449
a. Simple processing			Integrated	1.4	2.0	-0.4	9.7	- 1.7	312	110	522	-167
	Medium	19.3	Commission	1.4	3.9	2.4	16.4	9.7	1,454	1,105	2,711	1,475
			Integrated	0.2	2.1	1.8	8.7	7.7	5,625	5,275	5,406	4,170
	Large	32.2	Commission	1.1	3.8	2.7	16.1	11.1	2,405	1,969	4,189	2,649
			Integrated	0.2	2.9	2.7	12.0	11.0	10,158	9,722	11,384	9,844
b. Complex processing	Small	7.7	Commission	1.3	2.6	1.0	8.5	3.3	815	564	1,058	169
			Integrated	0.5	2.5	2.0	10.1	8.0	2,203	1,952	3,557	2,668
	Medium	18.5	Commission	1.5	3.9	2.4	15.4	9.4	1,383	1,031	2,584	1,342
			Integrated	0.2	2.0	1.8	8.0	7.0	5,493	5,141	5,238	3,996
	Large	46.3	Commission	0.9	3.8	2.9	16.0	11.9	3,678	3,139	6,337	4,432
			Integrated	0.1	2.9	2.7	11.2	10.6	16,392	15,852	15,222	13,317
c. Hosiery products	Small	2.5	Own hosiery	0.8	1.2	0.0	7.3	0.1	421	233	399	-302
			Integrated	0.5	1.9	1.4	7.1	5.0	1,102	9.4	380	-280
	Medium	5.5	Own hosiery	0.4	2.0	1.6	6.1	4.9	1,611	1,401	939	199
			Integrated	0.5	3.1	2.7	22.0	18.1	1,886	1,676	4,236	3,495
	Large	12.6	Own hosiery	0.2	1.9	1.7	8.1	7.3	3,967	3,716	3,489	2,600
			Integrated	0.2	3.1	2.8	21.7	19.7	4,375	4,124	9,661	8,772
6. Carpet finishing	Small	8.9	Integrated	0.6	2.4	1.8	9.9	7.2	1,335	1,125	2,672	1,931
	Medium	48.6	Integrated	0.3	1.7	1.4	9.5	7.8	3,515	3,163	6,910	5,668
	Large	121.6	Integrated	0.3	2.0	1.8	8.4	7.2	7,012	6,472	13,918	12,013
7. Stock & yarn finishing	Small	4.3	Commission	5.2	2.4	-9.7	18.7	-47.2	102	-252	218	-788
			Own yarn	0.8	1.8	0.1	8.7	0.7	435	227	449	-296
			Integrated	1.1	2.1	0.0	12.3	0.4	403	194	745	-24
	Medium	9.8	Commission	2.5	3.2	-1.7	16.3	-5.2	366	106	807	-173
			Own yarn	0.8	1.6	0.8	6.3	2.9	868	618	766	-117
			Integrated	0.9	2.0	1.0	11.5	5.7	901	652	1,505	622
	Large	23.5	Commission	2.3	3.5	0.7	17.9	3.8	751	401	1,577	336
			Own yarn	0.6	2.3	1.8	9.7	7.1	2,382	2,032	3,285	2,049
			Integrated	0.5	2.2	1.7	10.6	7.8	1,874	1,524	3,624	2,388
	X-Large	58.6	Own yarn	0.4	3.1	2.8	13.2	11.6	8,340	7,799	16,639	14,733
			Integrated	0.3	2.2	1.8	8.6	7.1	4,393	3,853	7,589	5,682

Continued.....

Table VIII-22. (Continued)

Subcategory	Size	Daily capacity	Type plant	Price increase required	Return on Sales		Return on Assets		Cash Flow		Net Present Value	
					Baseline	After controls	Baseline	After controls	Baseline	After controls	Baseline	After controls
		(kkg)		(%)	(%)	(%)	(%)	(%)	($1,000)			
8. Nonwoven manufacturing	Small	10.4	N.A.	0.5	2.6	2.0	14.7	11.2	1,553	1,344	2,588	1,817
	Medium	23.6	N.A.	0.3	2.3	2.1	10.7	9.3	3,795	3,543	4,961	4,072
	Large	56.7	N.A.	0.2	3.1	2.9	13.8	12.9	9,933	9,581	14,393	13,151
9. Felted fabric processing	Small	0.9	N.A.	1.2	5.3	4.1	13.0	9.7	1,194	1,007	2,279	1,619
	Medium	4.4	N.A.	0.7	2.0	1.2	7.3	4.4	1,186	933	1,022	128
	Large	10.7	N.A.	3.1	1.2	-7.0	7.5	-33.7	159	-499	79	-1,557

1/ Recommended option is Option 2 for all subcategories.

returns of the small integrated models exceed 2 percent in all subcategories except wool finishing and stock and yarn finishing. The small wool finishing model has a return of only 1.0 percent while the small integrated yarn model has a slightly higher return of 1.5 percent. The large integrated models have returns in excess of 2.5 percent, in most of the subcategories. The own fabric (and yarn) models have relatively low returns when compared to the same size commission and integrated models. In most cases, the returns of these type models fall between 1.3 and 2.0 percent.

Under the recommended options, the return on assets generally follow a pattern similar to that of the return on sales. Negative returns on assets occur for both the small and medium wool scouring models (-21.0 and -1.8 percent, respectively), the small commission woven (simple) model (-1.6 percent) and the small own hosiery model (-0.4 percent). While the small commission models have relatively low returns in all subcategories, the large commission models generally have some of the highest returns, reflecting both relatively high levels of profits and low levels of assets. The return for the small integrated models generally fall between 8.5 and 11.5 percent. The return on assets for the small own model plants range from 1.0 percent for the small own fabric woven (simple) to 5.8 percent for the small own fabric woven (desizing) model.

Under the recommended options, only one model shows a negative cash flow - the small wool scouring. Two models have annual flows of less than $100,000 - the small commission woven fabric (simple) and the small own hosiery models. All of the small commission models have annual cash flows of less than one million dollars. The flows of the small integrated models exceed a million dollars in all cases except in yarn finishing.

The small integrated yarn finishing model has a flow of about $800,000. In woven fabric finishing, the cash flows of the own fabric models fall between the flows of the commission and integrated models for each of the size categories. The small own fabric model in the woven (simple) subdivision has a cash flow of slightly over $200,000. The cash flows of the other own fabric models in the woven fabric finishing subcategory exceed a million dollars.

Under the recommended options, 9 model plants show negative net present values - all three of the wool scouring, two woven fabric (simple), one wool finishing, one hosiery, and two yarn finishing models. Based on the NPV analysis, 6 of the model plants are projected as closures and 3 as marginal. Closures include 3 wool scouring, 2 woven fabric, and 1 hosiery model plants. Marginal model plants include the small wool finishing and two yarn finishing models.

b. PSES. Under the recommended PSES option (Option 2), price increases required by the indirect dischargers range from a low of a tenth of a percent to a high of over 5 percent. The highest increase is required by the small commission yarn model plant which requires an increase of 5.2 percent. Other model plants with high required increases are the small wool scouring (3.9 percent), the small commission woven fabric (simple) (4.8 percent), the small commission knit fabric (simple) (3.2 percent), and the large felted fabric (3.1 percent). The large integrated models in all subcategories require increases of 0.3 percent or less.

Model plant return on sales vary from a high of over 5 percent for the small felted fabric model to a low of -9.7 percent (loss) for the small commission yarn model. Other model plants showing significant losses are the wool scouring with a return of -7.4 percent, the small woven fabric (simple) with -9.6 percent, the small commission knit fabric (simple) with -4.6 percent, and the large felted fabric with -7.0 percent. Five of the seven small commission model plants have negative returns under the recommended option. The small own woven fabric (simple) model has a return of -2.6 percent. The other small own fabric (yarn, hosiery) models have returns of 1.0 percent or less. Relatively large returns of around 3 percent are shown for the large integrated models in the wool, woven fabric and knit fabric finishing subcategories. The large integrated models in both carpet finishing and yarn finishing have returns of about 1.8 percent under Option 2.

Under the recommended option, return on assets vary from a low of -47.2 percent for the small commission yarn model to a high of 19.7 percent for the large integrated hosiery model plant. Other large negative returns are shown for the small wool scouring (-30.9 percent), the small commission woven fabric (simple), (-24.9 percent), the small commission knit fabric (simple), (-14.6 percent), and the large felted fabric model (33.7 percent). As was the case for return on sales, the return on assets are negative for most of the small commission models. Except for the carpet and yarn finishing, all of the large integrated models have returns on assets of 10 percent or higher. The returns of the large models in those two subcategories are about 7 percent. The returns of most of the own fabric models, other than the smallest, vary between 5 and 10 percent.

Under Option 2, six model plants have negative cash flows: the small wool scouring, both the small commission and small own fabric models of woven fabric finishing (simple), the small commission knit fabric (simple), the small commission yarn finishing, and the large felted fabric model. Cash flows of the other model plants ranged from about $100,000 for a number of the small models to close to $37 million for the large integrated woven fabric (desizing) model. The highest flows occur in woven fabric finishing with three models showing amounts in excess of $20 million. High annual flows are also shown in wool finishing with close to $10 million for the medium model and over $19 million for the large. The lowest cash flows occur in stock and yarn finishing with over half of the models having less than $1 million.

Under the recommended PSES Option, 19 model plants or over one fourth of the indirect discharge models show negative net present values. Both of the wool scouring model plants have negative values while one of the models in wool finishing shows a negative net present value. In woven fabric finishing, all three of the small commission models show negative values. Also, two of the medium commission models in this subcategory and one of the own fabric models show negative values. Of those showing negative net present values, 14 model plants are projected as closures and five as marginal. The two wool scouring models become closures and the small wool finishing model becomes marginal. In woven fabric finishing all of the small commission models are shown as closures as well as one of the medium models. The small own fabric model is projected as a closure and the medium commission (complex) model is shown as marginal. Both of the small knit fabric (simple) models are projected as closures. In the hosiery products subdivision, the own hosiery model is shown as a closure while the small integrated model is marginal. In stock and yarn finishing, three models are projected as closures and two as marginal. The large felted fabric model becomes a closure.

3. Plant Closures

As shown in Tables VIII-9 and VIII-19 the following plants are projected to close under the recommended options.

	Projected Closures 1/		
	BAT	PSES	Total
Wool scouring	3	7	10
Wool finishing	2	6	8
Woven fabric finishing			
- Simple processing	1	-	1
- Complex processing	-	4	4
- Desizing	-	3	3
Knit fabric finishing			
- Hosiery products	1	18	19
Stock & yarn finishing	2	14	16
Total	9	52	61

1/ Excludes plants projected to close under baseline.

4. Production Loss

The production losses resulting from the imposition of wastewater control requirements will depend upon the number of actual plant closings and the capability of the remaining plants to absorb the lost production of those plants which actually do close. Based on the assumptions that all the projected plant closures occur and that no plants remaining in operation absorb the closing plants production, the total projected potential annual production losses associated with each of the proposed treatment options can be estimated. Production capacity associated with the projected closures is summarized as follows:

Subcategories	Potentially Cost Production Direct Dischargers	 Indirect Dischargers	 Total
	(1,000 lbs.)		
Wool scouring	56,200	100,400	156,600
Wool finishing	6,600	8,400	15,000
Woven fabric finishing	2,400	50,700	53,100
Hosiery products	1,100	21,300	22,400
Stock & yarn finishing	8,600	31,800	40,400
Total	74,900	212,600	287,500

It should be noted these projected potential losses reflect the lost production of those plants projected to close due to wastewater control requirements. If such closures and the resulting production losses occur, it would be anticipated much of the lost production would be absorbed either by existing plants with excess capacity or by increases in imports. While estimates of the actual proportion of the production losses which would be absorbed were not attempted, it would be expected the absorbed proportion would be high with very little actual production being lost.

5. Employment Effects

The number of employees in the textile industry was reported by the Department of Commerce to be 900,200 individuals in 1977, with historical employment rarely deviating below 900,000 or above 1 million individuals. Based on the industry structure discussed previously in this report, the estimated number of individuals employed by those operations which could potentially be shutdown due to wastewater control requirements is approximately 1.2 percent of the total number of employees in the industry.

The potential reductions in employment under recommended option of BAT and PSES are listed below. Total number of employees is based on the number of employees per plant shown in Tables VI-1 and VI-2 and the projected closures indicated above.

	Employment Losses BAT	 PSES	 Total
Wool scouring	564	1,102	1,666
Wool finishing	860	1,170	2,030
Woven fabric finishing			
- Simple processing	38	-	38
- Complex processing	-	539	539
- Desizing	-	516	516
Knit fabric finishing			
- Hosiery products	124	5,529	5,653
Stock and yarn finishing	207	847	1,054
Total	1,793	9,703	11,496

6. Community Effects

The closure of approximately 60 mills under the recommended direct and indirect options can be expected to have impacts of varying degrees on the communities involved. The greatest impacts can be anticipated in the northeast among the small communities built up around textile mills.

Of the mills projected to close, approximately 50 percent will be commission mills which are predominantly located in the northeast. For the most part, these mills are small mills employing less than 200 individuals and are concentrated primarily in Pennsylvania, New York, New Jersey, and Massachusetts. These mills are dispersed among both the large metropolitan areas and smaller communities. These smaller communities in the northeast are believed to be relatively large (generally over 20,000) when compared to other small communities in the United States. However, employees losing their jobs in the textile mills in this region can be expected to have great difficulty in finding new employment because of the relatively high unemployment in the areas and the nontransferability of their textile skills.

The impact of closure will be felt on a lesser number of communities in the southeast but can be expected to be substantial, primarily due to the greater size of the mills and the smaller size of the communities involved. Mills that are projected to close in the southeast are anticipated to be the larger integrated mills and mills finishing their own textile goods (woven fabric, yarn, and hosiery). From data contained in Davison's Blue Book concerning dyers and finishers and mills with dyeing and finishing equipment, it was possible to estimate where these closures may occur. According to Davison's Blue Book about 50 percent of the yarn and hosiery finishers are located in communities of less than 10,000 people (based on 1970 census data) with about 70 percent of the hosiery mills located in these size communities. Although a textile community of 5,000 people typically hosts from 3 to 6 mills, usually it will have only a single finisher. Consequently, several small communities can be expected to be directly affected by mill closures. With payroll losses varying from about one half million to over 2 million dollars, severe impacts can be expected to fall on these communities. It is very unlikely that the employment losses from a mill closure could easily be absorbed in these small southeastern communities. The remaining closures can be expected to occur in the larger communities in which the ramifications of a mill closure would be considerably less.

7. Dislocational Effects

The availability of land for construction of additional wastewater treatment facilities varies widely within the textile industry. Among the commission mills in the Northeast, very little additional land is believed to be available particularly for those facilities within large urban areas. However, in the Southeast, with a few exceptions, additional land acquisition for the larger integrated type mills is not generally a problem. As the treatment technologies have small space requirements which can be met, in most cases, within existing land resources, no significant dislocational effects are expected to result with the imposition of controls. It should be noted that mills with relatively limited available space often can capitalize unutilized in-house space, reorganize operations, and utilize less space-intensive technologies in order to comply with wastewater control requirements. Those very few mills without the required space are not likely to relocate. For the integrated mills, curtailment of finishing operations may be a feasible alternative; in these cases, greige textiles would be shipped elsewhere to be finished. For the commission mills, relocation would be very unlikely as these mills generally exist to serve specific markets. Relocation would reduce their ability to compete in those markets.

8. Balance of Trade Impacts

The imposition of the various treatment options on the textile industry is expected to have a negative effect on the United States balance of trade. Price increases required to maintain existing levels of profitability by the larger plants range from about 0.1 to 0.2 percent for the recommended option. However, this general pressure to raise prices will be offset by the existing dischargers, both BAT and PSES, that will not be required to install treatment systems. Approximately 60 percent of the existing direct dischargers and 15 percent of the indirect dischargers will be required to install pollution control equipment. As a result the overall price increases are expected to be less than the price increases required. The textile industry has historically competed with foreign producers and has gradually lost market share.

E. New Source Performance Standards (NSPS)

The effects of NSPS on model plants representative of new source direct dischargers are analyzed for fivc treatment alternatives. As shown below.

NSPS Treatment Alternatives

Option	Technology	Description
1	A	(BPT) Biological treatment
NA	Q	Powdered activated carbon treatment
2	R	Biological treatment, chemical coagulation and multimedia filtration
NA	S	Screening, equalization, multimedia filtration; and granular activated carbon adsorption (for toxic pollutant waste streams)
3	T	Screening, equalization, chemical coagulation, sedimentation, and multimedia filtration and granular activated carbon adsorption (for those pollutant waste streams)
NA	V	Segmentation of toxic pollutant waste streams from other waste streams. Provide multimedia filtration for toxic pollutant waste streams and biological treatment for other waste streams.

The analysis follows the same general approach as that for the existing sources and covers required price increases, financial effects, impacts on viability, and RCRA effects. The recommended option under NSPS is Option 2, Technology R, "biological treatment, chemical coagulation and multimedia filtration." Consequently, this option will be highlighted.

1. Required Price Increases

Required price increases under NSPS are contained in Table VIII-23. Within each subcategory, the commission models require significantly higher increases than the other type models. In wool finishing, the price increases required vary between 1.0 percent for Alternative S to 1.3 percent for Alternative R (Option 2). Among the commission models the highest increases are required in stock and yarn finishing with an increase of 8.9 percent required. The lowest increases for commission models are required in woven fabric finishing. For the own fabric (yarn, hosiery) models, the increases vary under Alternative R (Option 2) from 0.6 percent for the simple and complex woven models to 1.1 percent for the stock and yarn finishing model. The lowest increase for integrated models is 0.3 percent for the carpet finishing model. Except for the wool finishing model, all increases are less than one percent.

2. Financial Effects

a. Return on Sales

The returns on sales and reductions in returns on sales are shown in Tables VIII-24 and VIII-25 for new sources under NSPS. The baseline returns vary from 4.9 percent for the nonwoven manufacturing model to 11.3 percent for the commission knit fabric (simple) model. Under the costs of NSPS these returns are reduced from over a hundred percent reduction for the commission yarn plant under Option 2 to less than 5 percent for the integrated simple and complex woven fabric models under the same option. The returns under Alternative R (Option 2) vary from a negative 0.3 percent for the commission yarn plant to 9.6 percent for the commission desizing woven fabric plant.

b. Returns on Total Assets

Under baseline the returns on assets vary from a high of 28.1 percent for the own hosiery model to 9.6 percent for the commission yarn model (Table VIII-26). The reductions in the returns on assets correspond to the reductions of returns on sales. The returns on assets vary from a low of negative 0.3 percent for the commission yarn model to a high of 25.1 percent for the own hosiery model.

c. Annual Cash Flows

The effects on the annual cash flow in year 21 of NSPS are contained in Table VIII-27. Under baseline the cash flows vary from a low of about $1 million for the commission yarn model to over $57 million for the

Table VIII-23. The textile industry, new source model plants average required price increase necessary to offset expenditures for wastewater controls-direct dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (NSPS)-new sources					
				A	Q	R	S	T	U
		(kkg)		(percent)					
1. (Omitted)									
2. Wool finishing	Medium	18.6	Integrated	0.9	1.2	1.3	1.0	1.2	1.1
3. (Omitted)									
4. Woven fabric finishing									
a. Simple processing	Medium	29.6	Commission	1.3	3.0	2.1	2.5	3.1	1.6
			Own fabric	0.4	0.9	0.6	0.8	0.9	0.5
			Integrated	0.2	0.6	0.4	0.5	0.6	0.3
b. Complex processing	Medium	116.3	Commission	1.2	-	1.8	1.2	1.5	1.5
			Own fabric	0.4	-	0.6	0.4	0.5	0.5
			Integrated	0.3	-	0.5	0.3	0.4	0.4
c. Desizing	Medium	53.6	Commission	1.5	1.8	2.1	1.5	1.9	1.7
			Own fabric	0.6	0.8	0.9	0.6	0.8	0.7
			Integrated	0.4	0.5	0.6	0.5	0.6	0.5
5. Knit fabric finishing									
a. Simple processing	Medium	32.2	Commission	2.3	2.9	3.2	2.4	2.9	2.7
			Integrated	0.4	0.5	0.5	0.4	0.5	0.4
b. Complex processing	Medium	18.5	Commission	1.6	3.7	2.6	3.2	3.8	2.0
			Integrated	0.3	0.7	0.5	0.6	0.7	0.4
c. Hosiery products	Medium	5.5	Own hosiery	0.4	1.3	0.6	0.9	-	0.5
6. Carpet finishing	Small	20.2	Integrated	0.2	0.4	0.3	0.4	0.5	0.2
7. Stock & yarn finishing	Medium	23.4	Commission	6.0	11.3	8.9	11.1	12.6	6.9
			Own yarn	0.7	1.6	1.1	1.4	1.6	0.9
8. Nonwoven manufacturing	Medium	23.6	N.A.	0.3	0.9	0.5	0.8	1.0	0.4
9. Felted fabric processing	Medium	4.4	N.A.	0.9	2.3	1.3	2.1	2.6	1.1

Table VIII-24. The textile industry, new source model plants, effects of wastewater control expenditures on average after-tax returns on sales-direct dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (NSPS) -- new sources A	Q	R	S	T	U
		(kkg)		(percent)						
1. (Omitted)										
2. Wool finishing	Medium	18.6	Integrated	7.8	7.2	6.8	6.9	7.1	6.9	7.1
3. (Omitted)										
4. Woven fabric finishing										
a. Simple processing	Medium	29.6	Commission	8.3	7.0	5.9	6.5	6.5	6.0	6.6
			Own fabric	5.4	5.0	4.7	4.8	4.9	4.7	4.9
			Integrated	7.5	7.2	7.0	7.1	7.1	7.0	7.2
b. Complex processing	Medium	116.3	Commission	8.4	7.7	-	7.2	7.5	7.2	7.5
			Own fabric	5.5	5.3	5.1	5.2	5.3	5.1	5.2
			Integrated	7.0	6.8	-	6.7	6.7	6.6	6.7
c. Desizing	Medium	53.6	Commission	11.1	10.1	9.4	9.6	9.9	9.6	9.9
			Own fabric	5.7	5.4	5.1	5.2	5.3	5.1	5.3
			Integrated	7.3	7.0	6.8	6.8	6.9	6.8	6.9
5. Knit fabric finishing										
a. Simple processing	Medium	32.2	Commission	11.3	9.8	8.8	9.1	9.6	9.0	9.5
			Integrated	6.8	6.6	6.5	6.5	6.6	6.5	6.6
b. Complex processing	Medium	18.5	Commission	11.0	9.4	8.1	8.7	8.8	8.2	9.1
			Integrated	6.9	6.5	6.3	6.5	6.5	6.4	6.5
c. Hosiery products	Medium	5.5	Own hosiery	7.1	6.6	6.2	6.5	6.1	-	6.6
6. Carpet finishing	Small	20.2	Integrated	6.6	6.5	6.3	6.4	6.4	6.3	6.4
7. Stock & yarn finishing	Medium	23.4	Commission	9.8	3.4	-4.4	-0.3	0.1	-3.6	1.9
			Own yarn	6.8	6.1	5.5	5.8	5.8	5.5	5.9
8. Nonwoven manufacturing	Medium	23.6	N.A.	4.9	4.5	4.2	4.4	4.3	4.2	4.5
9. Felted fabric processing	Medium	4.4	N.A.	6.0	5.1	4.4	4.8	4.7	4.2	5.0

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Table VIII-25. The textile industry, new source model plants, percentage reductions in model's income due to wastewater control expenditures-direct dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (NSPS)-new sources					
				A	Q	R	S	T	U
		(kkg)		(percent)					
1. (Omitted)									
2. Wool finishing	Medium	18.6	Integrated	7.6	13.1	11.5	9.4	12.1	9.0
3. (Omitted)									
4. Woven fabric finishing									
a. Simple processing	Medium	29.6	Commission	15.4	28.8	22.2	21.3	27.7	18.3
			Own fabric	7.2	13.4	10.3	9.9	12.9	8.5
			Integrated	3.3	6.2	4.8	4.6	6.0	3.9
b. Complex processing	Medium	116.3	Commission	8.8	-	14.1	11.2	14.3	10.6
			Own fabric	4.5	-	7.2	5.7	7.3	5.2
			Integrated	3.0	-	4.8	3.8	4.9	3.6
c. Desizing	Medium	53.6	Commission	8.5	14.7	12.9	10.6	13.6	10.1
			Own fabric	6.7	11.6	10.1	8.3	10.6	8.0
			Integrated	3.8	6.6	5.8	4.8	6.1	4.6
5. Knit fabric finishing									
a. Simple processing	Medium	32.2	Commision	13.6	22.0	19.5	15.7	20.2	15.9
			Integrated	3.5	5.7	5.1	4.1	5.3	4.2
b. Complex processing	Medium	18.5	Commission	14.4	26.9	20.7	19.8	25.8	17.0
			Integrated	4.1	7.6	5.9	5.6	7.3	4.8
c. Hosiery products	Medium	5.5	Own hosiery	6.5	11.9	7.9	13.7	-	7.1
6. Carpet finishing	Small	20.2	Integrated	2.7	4.8	3.5	3.9	5.2	3.0
7. Stock & yarn finishing	Medium	23.4	Commission	65.5	145.0	102.7	98.6	136.9	80.6
			Own yarn	10.1	18.9	14.6	14.0	18.1	12.0
8. Nonwoven manufacturing	Medium	23.6	N.A.	7.3	13.1	9.6	10.8	14.2	8.4
9. Felted fabric processing	Medium	4.4	N.A.	15.2	27.2	20.1	22.4	29.5	17.4

Table VIII-26. The textile industry, new source model plants, effects of wastewater control expenditures on average after-tax returns on total assets-direct dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (NSPS) -- new sources					
					A	Q	R	S	T	U
		(kkg)		(percent)						
1. (Omitted)										
2. Wool finishing	Medium	18.6	Integrated	23.2	20.6	19.3	19.4	20.2	19.4	20.1
3. (Omitted)										
4. Woven fabric finishing										
a. Simple processing	Medium	29.6	Commission	15.3	12.6	10.1	11.3	11.3	10.2	12.0
			Own fabric	13.4	12.3	11.3	11.8	11.7	11.3	12.1
			Integrated	15.5	14.9	14.3	14.6	14.6	14.3	14.8
b. Complex processing	Medium	116.3	Commission	16.9	14.9	-	13.8	14.5	13.9	14.5
			Own fabric	12.2	11.5	-	11.1	11.4	11.2	11.4
			Integrated	12.1	11.6	-	11.3	11.5	11.4	11.5
c. Desizing	Medium	53.6	Commission	23.9	20.9	19.4	19.5	20.4	19.6	20.3
			Own fabric	12.2	11.2	10.6	10.7	11.0	10.7	11.0
			Integrated	13.5	12.9	12.5	12.5	12.7	12.5	12.7
5. Knit fabric finishing										
a. Simple processing	Medium	32.2	Commission	20.4	16.6	14.9	15.1	16.2	15.1	16.0
			Integrated	19.8	18.8	18.3	18.4	18.7	18.4	18.6
b. Complex processing	Medium	18.5	Commission	18.1	15.0	12.2	13.6	13.4	12.3	14.4
			Integrated	18.7	17.8	16.9	17.4	17.3	16.9	17.6
c. Hosiery products	Medium	5.5	Own hosiery	28.1	25.7	22.9	25.1	28.3	-	25.4
6. Carpet finishing	Small	20.2	Integrated	21.2	20.5	19.8	20.3	20.0	19.7	20.4
7. Stock & yarn finishing	Medium	23.4	Commission	9.6	2.3	-2.7	0.3	0.7	-2.0	2.1
			Own yarn	15.9	14.0	12.2	13.1	13.1	12.3	13.6
8. Nonwoven manufacturing	Medium	23.6	N.A.	11.8	10.8	9.9	10.5	10.2	9.8	10.7
9. Felted fabric processing	Medium	4.4	N.A.	6.8	5.7	4.8	5.3	5.1	4.6	5.5

Table VIII-27. The textile industry, new source model plants, effects of wastewater control expenditures on annual cash flows (year 21)-direct dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (NSPS) - new sources A	Q	R	S	T	U
		(kkg)		($1,000)						
1. (Omitted)										
2. Wool finishing	Medium	18.6	Integrated	12,996	12,373	11,748	11,028	12,151	11,884	12,253
3. (Omitted)										
4. Woven fabric finishing										
a. Simple processing	Medium	29.6	Commission	3,995	3,570	3,262	3,408	3,490	3,315	3,506
			Own fabric	8,960	8,535	8,227	8,373	8,454	8,280	8,470
			Integrated	18,594	18,169	17,861	18,007	18,088	17,914	18,105
b. Complex processing	Medium	116.3	Commission	17,662	16,787	-	16,181	16,396	16,000	16,600
			Own fabric	38,332	37,456	-	36,850	37,065	36,669	37,269
			Integrated	57,393	56,518	-	55,912	56,126	55,731	56,330
c. Desizing	Medium	53.6	Commission	11,549	10,926	10,301	10,583	10,704	10,444	10,806
			Own fabric	17,718	17,095	16,471	16,752	16,873	16,613	16,976
			Integrated	30,023	29,400	28,776	29,057	29,178	28,918	29,281
5. Knit fabric finishing										
a. Simple processing	Medium	32.2	Commission	6,268	5,729	5,305	5,493	5,619	5,411	5,641
			Integrated	23,566	23,027	22,603	22,791	22,917	22,709	22,939
b. Complex processing	Medium	18.5	Commission	4,124	3,699	3,391	3,538	3,619	3,444	3,635
			Integrated	14,218	13,793	13,486	13,632	13,713	13,538	13,729
c. Hosiery products	Medium	5.5	Own hosiery	4,878	4,607	4,470	4,560	4,298	-	4,587
6. Carpet finishing	Small	20.2	Integrated	15,768	15,445	15,265	15,361	15,384	15,235	15,410
7. Stock & yarn finishing	Medium	23.4	Commission	1,221	797	489	634	716	545	732
			Own yarn	5,909	5,484	5,176	5,322	5,404	5,232	5,420
8. Nonwoven manufacturing	Medium	23.6	N.A.	6,225	5,903	5,722	5,818	5,841	5,693	5,867
9. Felted fabric processing	Medium	4.4	N.A.	4,338	4,016	3,835	3,930	3,954	3,805	3,980

integrated woven (complex) model. From baseline, the cash flow of the commission yarn model is reduced by over 50 percent to $634,000 under Alternative R (Option 2). The cash flow of the integrated woven (complex) model is reduced less than 3 percent or just under $56 million. The cash flows of the commission models, in most cases, are less than $15 million. The highest cash flows occur in the woven fabric finishing subcategories; the lowest in stock and yarn finishing.

d. Net Present Values

The net present values of the new source direct dischargers both under baseline and NSPS controls are shown in Table VIII-28. The NPV's vary under baseline from a negative $984,000 for the commission yarn model to over $35 million for the integrated simple processing knit fabric model. The commission yarn model is the only model with a negative NPV under baseline (indicating its infeasibility from a purely economic point of view). Under Alternative R (Option 2), two models show negative NPV's - the commission yarn model and the own fabric woven desizing model.

3. Viability of New Source Models Under NSPS

Table VIII-29 shows the viability of the model plants under NSPS. All models are projected as viable under baseline except for the commission yarn model which is considered as a marginal operation. Under Alternative R, this model is projected as a closure, or infeasible. The own fabric desizing model in woven fabric finishing is considered to be marginal under Option 2, Technology R.

4. Effects of RCRA on New Source Direct Dischargers

As discussed in connection with BAT, RCRA resulted in relatively insignificant impacts. The profits, cash flows, and viability of the new source models are substantially greater than those of existing sources. Consequently, it can be assumed RCRA would have little if any effects on the new source direct dischargers.

F. Pretreatment Standards for New Sources (PSNS)

The effects of PSNS costs in new source indirect dischargers model plants were analyzed for five alternatives: A, O, R, S and T. These are described below.

Table VIII-28. The textile industry, new source model plants, effects of wastewater control expenditures on net present values-direct dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternatives (NSPS) - new sources					
					A	Q	R	S	T	U
		(kkg)		($1,000)						
1. (Omitted)										
2. Wool finishing	Medium	18.6	Integrated	18,746	16,312	14,246	15,019	15,602	14,659	15,846
3. (Omitted)										
4. Woven fabric finishing										
a. Simple processing	Medium	29.6	Commission	2,847	1,350	154	734	920	302	2,166
			Own fabric	3,915	2,419	1,223	1,803	1,988	1,370	1,098
			Integrated	12,033	10,537	9,341	9,921	10,107	9,489	10,285
b. Complex processing	Medium	116.3	Commission	15,463	11,973	-	9,741	10,766	9,394	11,243
			Own fabric	7,182	3,692	-	1,460	2,485	1,094	2,962
			Integrated	20,769	17,269	-	15,038	16,062	14,671	16,539
c. Desizing	Medium	53.6	Commission	18,256	15,822	13,756	14,536	15,112	14,190	15,357
			Own fabric	252	-2,182	-4,248	-3,468	-2,892	-3,814	-2,647
			Integrated	9,735	7,301	5,235	6,016	6,591	5,669	6,836
5. Knit fabric finishing										
a. Simple processing	Medium	32.2	Commission	8,156	6,087	4,660	5,186	5,724	4,986	5,742
			Integrated	35,273	33,204	31,726	32,303	32,841	32,103	32,859
b. Complex processing	Medium	18.5	Commision	3,803	2,306	1,110	1,694	1,876	1,258	2,054
			Integrated	16,749	15,252	14,056	14,639	14,822	14,204	15,000
c. Hosiery products	Medium	5.5	Own hosiery	11,410	10,465	9,827	10,280	9,396	-	10,381
6. Carpet finishing	Small	20.2	Integrated	27,230	26,098	25,331	25,771	25,718	25,194	25,955
7. Stock & yarn finishing	Medium	23.4	Commission	-984	-2,481	-3,677	-3,097	-2,911	-3,517	-2,733
			Own yarn	6,753	5,257	4,061	4,641	4,827	4,220	5,004
8. Nonwoven manufacturing	Medium	23.6	N.A.	8,181	7,049	6,282	6,722	6,669	6,145	6,906
9. Felted fabric processing	Medium	4.4	N.A.	-7,051	-8,183	-8,951	-8,516	-8,564	-9,089	-8,326

Table VIII-29. The textile industry, new source model plants projected closures-direct dischargers

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternatives (NSPS) - new sources					
					A	Q	R	S	T	U
1. (Omitted)										
2. Wool finishing	Medium	18.6	Integrated	V	V	V	V	V	V	V
3. (Omitted)										
4. Woven fabric finishing										
a. Simple processing	Medium	29.6	Commission	V	V	V	V	V	V	V
			Own fabric	V	V	V	V	V	V	V
			Integrated	V	V	V	V	V	V	V
b. Complex processing	Medium	116.3	Commission	V	V	-	V	V	V	V
			Own fabric	V	V	-	V	V	V	V
			Integrated	V	V	-	V	V	V	V
c. Desizing	Medium	53.6	Commission	V	V	V	V	V	V	V
			Own fabric	V	M	M	M	M	M	M
			Integrated	V	V	V	V	V	V	V
5. Knit fabric finishing										
a. Simple processing	Medium	32.2	Commission	V	V	V	V	V	V	V
			Integrated	V	V	V	V	V	V	V
b. Complex processing	Medium	18.5	Commission	V	V	V	V	V	V	V
			Integrated	V	V	V	V	V	V	V
c. Hosiery products	Medium	5.5	Own hosiery	V	V	V	V	V	-	V
6. Carpet finishing	Small	20.2	Integrated	V	V	V	V	V	V	V
7. Stock & yarn finishing	Medium	23.4	Commission	M	C	C	C	C	C	C
			Own yarn	V	V	V	V	V	V	V
8. Nonwoven manufacturing	Medium	23.6	N.A.	V	V	V	V	V	V	V
9. Felted fabric processing	Medium	4.4	N.A.	C	C	C	C	C	C	C

V = Viable, M = Marginal, C = Closure.

PSNS Treatment Alternatives

Option	Technology	Description
1	A	Preliminary treatment (screening equalization and/or neutralization)
2	O	Preliminary treatment - segregation of pollutant waste streams
NA	R	Screening, equalization, chemical coagulation, sedimentation and multimedia filtration
NA	S	Screening, equalization, multimedia filtration and granular activated carbon adsorption
3	T	Screening, equalization, chemical coagulation, sedimentation, multimedia filtration and granular activated carbon adsorption

The effects of these alternatives are outlined below with the principal focus on Technology O (Option 2), the recommended option.

1. Required Price Increases

Required price increases for the representative models under PSNS are contained in Table VIII-30. The largest of the models require increase of less than one percent. Eight of the models require increases of only 0.2 percent. The largest increase is required by the commission yarn model, 3.5 percent under Alternative O (Option 2). The only other models requiring increases greater than one percent are the commission models in the woven and knit fabric finishing subcategories.

2. Financial Effects

a. Return on Sales

The returns on sales of the models both under baseline and under PSNS are contained in Table VIII-31. Table VIII-32 shows the reductions in these returns under PSNS from baseline. The returns under baseline vary from a low of 6.0 percent for the felted fabric model to 11.4 percent for the commission woven-complex model. The returns for the own fabric (yarn) models are about 6 percent while the integrated models are generally about 7 percent. Under Alternative O (Option 2), the greatest reduction occurs in the case of the commission yarn model - over 35 percent. Under Alternative O, the returns for the models vary from a low of 5.3 percent for the felted fabric model to close to 12 percent for the commission woven (desizing) model. The returns for all of the own fabric (and yarn) models are less than 6 percent while the returns of most of the integrated models exceed 7 percent.

Table VIII-30. The textile industry, new source model plants impacts, average required price increase necessary to offset expenditures for wastewater controls-indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (PSNS)--New Sources			
				O	R	S	T
		(kkg)		----------------	(percent)	----------------	
1. (Omitted)							
2. Wool finishing	Medium	18.6	Integrated	0.3	0.3	0.6	0.7
3. (Omitted)							
4. Woven fabric finishing							
a. Simple processing	Medium	12.3	Commission	1.9	2.4	5.2	5.6
			Own fabric	0.6	0.7	1.6	1.7
			Integrated	0.3	0.4	0.8	0.8
b. Complex processing	Medium	23.3	Commission	1.4	1.9	3.7	4.1
			Own fabric	0.4	0.5	1.0	1.1
			Integrated	0.2	0.3	0.6	0.6
c. Desizing	Medium	53.6	Commission	0.6	0.8	1.5	1.7
			Own fabric	0.2	0.3	0.6	0.7
			Integrated	0.2	0.2	0.4	0.5
5. Knit fabric finishing							
a. Simple processing	Medium	19.3	Commission	1.3	1.8	3.4	3.7
			Integrated	0.2	0.3	0.5	0.6
b. Complex processing	Medium	18.5	Commission	1.4	1.9	3.5	3.9
			Integrated	0.2	0.3	0.5	0.6
c. Hosiery products	Large	12.6	Own hosiery	0.2	0.2	0.5	0.5
			Integrated	0.2	0.3	0.6	0.7
6. Carpet finishing	Medium	48.6	Integrated	0.3	0.4	0.7	0.7
7. Stock & yarn finishing	Medium	9.8	Commission	3.5	4.4	9.3	10.1
			Own yarn	0.8	1.0	2.1	2.2
8. Nonwoven manufacturing	Large	56.7	N.A.	0.2	0.2	0.5	0.5
9. Felted fabric processing	Medium	4.4	N.A.	0.7	0.9	1.9	2.0

Table VIII-31. The textile industry, new source model plants effects of wastewater control expenditures on average after-tax returns on sales-indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternative (PSNS) -- new sources O	 R	 S	 T
		(kkg)		(percent)				
1. (Omitted)								
2. Wool finishing	Medium	18.6	Integrated	9.1	8.8	8.8	8.6	8.5
3. (Omitted)								
4. Woven fabric finishing								
a. Simple processing	Medium	12.3	Commission	11.2	9.3	9.1	8.0	7.8
			Own fabric	6.4	5.8	5.7	5.4	5.4
			Integrated	7.3	7.0	7.0	6.8	6.8
b. Complex processing	Medium	23.3	Commission	11.4	10.0	9.7	8.9	8.6
			Own fabric	5.2	4.8	4.8	4.6	4.5
			Integrated	7.6	7.4	7.3	7.2	7.2
c. Desizing	Medium	53.6	Commission	12.5	11.9	11.8	11.4	11.2
			Own fabric	5.8	5.6	5.5	5.3	5.3
			Integrated	7.1	7.0	6.9	6.8	6.7
5. Knit fabric finishing								
a. Simple processing	Medium	19.3	Commission	11.3	10.0	9.7	9.0	8.7
			Integrated	7.1	6.9	6.9	6.8	6.7
b. Complex processing	Medium	18.5	Commission	11.1	9.7	9.4	8.7	8.4
			Integrated	6.7	6.5	6.4	6.3	6.3
c. Hosiery products	Large	12.6	Own hosiery	7.2	7.1	7.0	6.9	6.9
			Integrated	7.6	7.3	7.3	7.2	7.2
6. Carpet finishing	Medium	48.6	Integrated	6.5	6.3	6.2	6.1	6.0
7. Stock & yarn finishing	Medium	9.8	Commission	9.8	6.3	5.8	3.5	2.9
			Own yarn	6.5	5.7	5.6	5.2	5.1
8. Nonwoven manufacturing	Large	56.7	N.A.	7.7	7.5	7.5	7.4	7.3
9. Felted fabric processing	Medium	4.4	N.A.	6.0	5.3	5.2	4.8	4.7

Table VIII-32. The textile industry, new source model plants effects of wastewater control expenditures on annual cash flows (year 21)-indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternative (PSNS) -- new sources			
					0	R	S	T
		(kkg)		($1,000)				
1. (Omitted)								
2. Wool finishing	Medium	18.6	Integrated	22,548	22,074	21.984	21,751	21,607
3. (Omitted)								
4. Woven fabric finishing a. Simple processing	Medium	12.3	Commission	1,831	1,587	1,563	1,501	1,473
			Own fabric	3,811	3,566	3,543	3,481	3,452
			Integrated	9,376	9,132	9,108	9,046	9,018
b. Complex processing	Medium	23.3	Commission	3,298	2,967	2.920	2,814	2,744
			Own fabric	7,124	6,793	6,746	6,640	6,571
			Integrated	16,574	16,243	16,196	16,090	16,021
c. Desizing	Medium	53.6	Commission	12,717	12,244	12,155	11.920	11.779
			Own fabric	17,794	17,320	17,232	16,997	16,855
			Integrated	30,565	30,091	30,003		
5. Knit fabric finishing a. Simple processing	Medium	19.3	Commission	3,576	2,431	2.242	1,722	1,488
			Integrated	22,467	21,322	21,133	20,613	20,379
b. Complex processing	Medium	18.5	Commission	3,608	3,277	3,231	3,124	3,055
			Integrated	14,347	14,016	13,970	13.863	13.794
c. Hosiery products	Large	12.6	Own hosiery	12,546	12,299	12.275	12,216	12,185
			Integrated	9,937	9,689	9,665	9,606	9,576
6. Carpet finishing	Medium	48.6	Integrated	10,819	10,488	10,442	10,335	10,266
7. Stock & yarn finishing	Medium	9.8	Commission	1,221	977	954	891	863
			Own yarn	2,917	2,673	2,649	2,587	2,559
8. Nonwoven manufacturing	Large	56.7	N.A.	23,299	22,968	22,921	22.814	22,746
9. Felted fabric processing	Medium	4.4	N.A.	4,338	4,090	4,065	4,008	3,976

b. Returns on Total Assets

The changes of the returns on assets resulting from PSNS are shown in Table VIII-33. Under baseline, the commission models generally show the greatest returns primarily because of their low inventory and associated costs. As expected, the lowest return is shown for the felted fabric model at 6.8 percent under baseline. The greatest returns occur in the hosiery products subcategory with 28.7 percent for the own hosiery model and 32.9 percent for the integrated models (under baseline). The return for the own fabric and integrated models under baseline vary between 10 and 20 percent. Other than the integrated hosiery model, the wool finishing model has the greatest return (21.0 percent) among the integrated models. Under Alternative 0, the reduction in the return on assets correspond with those of the returns on sales. The returns on assets of the commission models are reduced the greatest while those of the integrated models are reduced the least. Under the alternatives, the felted fabric and the commission yarn models have the lowest returns both about 6 percent. The hosiery models with the highest returns under baseline also have the highest under PSNS with 27.8 percent for the own hosiery model and 31.6 percent for the integrated model.

c. Annual Cash Flows

Annual cash flows of the new source indirect dischargers are shown both under baseline and under PSNS in Table VIII-34. The largest flows occur in the case of the integrated models with levels usually about 2 to 3 times as great as those of corresponding commission models. Under baseline, the largest cash flows occur in woven fabric finishing with flows ranging from close to $10 million for the integrated (simple) model to over $30 million for the integrated (desizing) model. In the same subcategory, the cash flow of the smallest commission model is less than $2 million while the value for the largest model is about $13 million which is less than half the size of the corresponding integrated model. Under Alternative 0 (Option 2), the reductions in cash flow vary from over 10 percent for the commission models to less than 5 percent for most of the integrated models. Under the recommended options, the cash flows vary from less than $2 million for the commission woven (simple) and commission yarn models to just over $30 million for the integrated woven (desizing) model.

d. Net Present Values

Table VIII-35 shows the NPV's of the model plants under baseline and under PSNS. Both under baseline and Alternative 0 (Option 2), negative values are shown for three models: the commission yarn, nonwoven, and felted fabric models. Under the other treatment alternatives only one additional model shows negative NPV's - the own fabric woven (complex) model under Alternatives S and T.

Table VIII-33. The textile industry, new source model plants percentage reductions in model's income due to wastewater control expenditures-indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Treatment alternatives (PSNS)--New Sources			
				O	R	S	T
		(kkg)		(percent)			
1. (Omitted)							
2. Wool finishing	Medium	18.6	Integrated	2.8	3.4	5.1	6.0
3. (Omitted)							
4. Woven fabric finishing							
a. Simple processing	Medium	12.3	Commission	17.1	19.4	28.5	30.8
			Own fabric	9.0	10.3	15.0	16.3
			Integrated	3.8	4.4	6.4	6.9
b. Complex processing	Medium	23.3	Commission	12.8	15.2	21.9	24.8
			Own fabric	7.4	8.7	12.6	14.3
			Integrated	3.0	3.6	5.2	5.9
c. Desizing	Medium	53.6	Commission	4.8	5.8	8.9	10.4
			Own fabric	4.2	5.1	7.8	9.1
			Integrated	2.5	3.0	4.6	5.4
5. Knit fabric finishing							
a. Simple processing	Medium	19.3	Commission	11.7	13.8	20.3	22.8
			Integrated	2.9	3.5	5.1	5.7
b. Complex processing	Medium	18.5	Commission	12.7	15.0	21.7	24.6
			Integrated	3.3	3.9	5.6	6.3
c. Hosiery products	Large	12.6	Own hosiery	2.4	2.7	3.9	4.2
			Integrated	3.0	3.4	5.0	5.4
6. Carpet finishing	Medium	48.6	Integrated	4.1	4.8	7.0	7.9
7. Stock & yarn finishing	Medium	9.8	Commission	35.6	40.9	64.5	70.8
			Own yarn	11.9	13.6	19.9	21.5
8. Nonwoven manufacturing	Large	56.7	N.A.	2.4	2.8	4.1	4.6
9. Felted fabric processing	Medium	4.4	N.A.	11.8	13.4	19.4	21.1

Table VIII-34. The textile industry, new source model plants effects of wastewater control expenditures on average after-tax returns on total assets-indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternative (PSNS) -- new sources O	R	S	T
		(kkg)		(percent)				
1. (Omitted)								
2. Wool finishing	Medium	18.6	Integrated	21.0	20.2	20.0	19.5	19.2
3. (Omitted)								
4. Woven fabric finishing								
a. Simple processing	Medium	12.3	Commission	25.5	20.1	19.1	15.4	14.7
			Own fabric	17.6	15.8	15.4	14.1	13.8
			Integrated	14.9	14.2	14.1	13.6	13.5
b. Complex processing	Medium	23.3	Commission	24.7	20.8	19.9	17.2	16.4
			Own fabric	11.5	10.5	10.3	9.8	9.5
			Integrated	12.7	12.2	12.1	11.9	11.7
c. Desizing	Medium	53.6	Commission	27.0	25.3	24.8	23.5	23.0
			Own fabric	12.3	11.7	11.6	11.1	10.9
			Integrated	11.6	11.3	11.2	11.0	10.9
5. Knit fabric finishing								
a. Simple processing	Medium	19.3	Commission	18.7	16.1	15.5	13.8	13.2
			Integrated	19.5	18.8	18.6	18.1	17.9
b. Complex processing	Medium	18.5	Commission	18.4	15.6	15.0	13.3	12.7
			Integrated	15.5	14.9	14.7	14.3	14.2
c. Hosiery products	Large	12.6	Own hosiery	28.7	27.8	27.7	26.9	26.7
			Integrated	32.9	31.6	31.3	30.0	29.8
6. Carpet finishing	Medium	48.6	Integrated	19.5	18.6	18.3	17.6	17.4
7. Stock & yarn finishing	Medium	9.8	Commission	9.6	6.0	5.4	3.3	2.8
			Own yarn	15.1	13.0	12.7	11.3	11.0
8. Nonwoven manufacturing	Large	56.7	N.A.	10.6	10.3	10.3	10.1	10.0
9. Felted fabric processing	Medium	4.4	N.A.	6.8	5.9	5.8	5.3	5.2

Table VIII-35. The textile industry, new source model plants effects of wastewater control expenditures on net present values-indirect dischargers

Subcategory	Size	Daily capacity	Type plant	Baseline	Treatment alternative (PSNS) -- new sources			
					O	R	S	T
		(kkg)		($1,000)				
1. (Omitted)								
2. Wool finishing	Medium	18.6	Integrated	25,560	23,887	23,534	22.592	22,067
3. (Omitted)								
4. Woven fabric finishing								
a. Simple processing	Medium	12.3	Commission	2,852	1,990	1.890	1,549	1,439
			Own fabric	3,132	2,270	2,169	1,828	1,718
			Integrated	5,570	4,708	4,608	4,267	4,157
b. Complex processing	Medium	23.3	Commission	5,707	4,541	4,350	3,853	3,597
			Own fabric	1.415	249	58	-439	-695
			Integrated	9,120	7,954	7,763	7,266	7,010
c. Desizing	Medium	53.6	Commission	22,495	20,823	20,477	19,527	19,009
			Own fabric	5,053	3,381	3,034	2,084	1,566
			Integrated	8,731	7,059	6,712	5.763	5,244
5. Knit fabric finishing								
a. Simple processing	Medium	19.3	Commission	3,576	2.431	2,242	1,722	1,488
			Integrated	22,467	21,322	21,133	20,613	20.379
b. Complex processing	Medium	18.5	Commission	3,847	2,682	2,493	1,994	1,740
			Integrated	10,530	9.364	9,175	8,676	8,422
c. Hosiery products	Large	12.6	Own hosiery	22,620	21.750	21,647	21.317	21,198
			Integrated	22,308	21.437	21.334	21,004	20,885
6. Carpet finishing	Medium	48.6	Integrated	13,113	11,948	11.758	11.260	11,006
7. Stock & yarn finishing	Medium	9.8	Commission	-984	-1.846	-1,947	-2,288	-2,397
			Own yarn	3,092	2.231	2,130	1,789	1,680
8. Nonwoven manufacturing	Large	56.7	N.A.	-5,876	-7,041	-7,230	-7,729	-7,983
9. Felted fabric processing	Medium	4.4	N.A.	-7,051	-7,925	-8,030	-8,354	-8,478

3. Viability of Model Plants Under PSNS

Model plant closures (or infeasible models) are shown in Table VIII-36 for PSNS controls. Under baseline, all model plants are viable except the three models with negative NPV's indicated above. The felted fabric model is designated as a closure (or economically infeasible) while the commission yarn and nonwoven manufacturing models are shown as marginal. Under Alternative 0 (Option 2), the commission yarn model also becomes a closure. The nonwoven model remains marginal.

4. Effects of RCRA

As discussed for the new source direct discharger model plant RCRA impacts are expected to be very minor on the new source direct discharger model plants.

G. Summary of Impacts of Recommended Options

Price increase. While the cost pressure of pollution controls may result in price increases in certain limited textile markets, no general or significant price increases are expected from BAT or PSES costs.

BAT. Nine direct discharger plants are projected to close as a result of BAT. These include: three wool scouring, two wool finishing, one woven fabric, one hosiery and two yarn finishers.

The annual production to be lost associated with the above closures is just under 75 million pounds.

The employment associated with the above closures is expected to be approximately 1,800 workers.

PSES. Under the recommended PSES option, 52 plants are projected to close. Thirty-two or 70 percent of these fall within two subcategories: hosiery products and yarn finishing.

The production loss associated with these closures is about 200 million pounds.

The employment level of the total projected closures exceeds 9,700 workers.

NSPS. From a limited economic point of view the commission yarn plants is considered unviable and the own fabric desizing plant is marginal under NSPS. All other new source direct dischargers are expected to be viable under controls.

PSNS. The commission yarn plant and felted fabric mills are considered unviable under PSNS controls.

RCRA. The impacts of RCRA are considered very minor in the textile industry. No projected closures are attributed to these controls.

Table VIII-36. The textile industry, new source model plants projected closures-indirect dischargers

Subcategory	Size	Daily capacity (kkg)	Type plant	Baseline	Treatment alternative (PSNS) -- new sources O	R	S	T
1. (Omitted)								
2. Wool finishing	Medium	18.6	Integrated	V	V	V	V	V
3. (Omitted)								
4. Woven fabric finishing								
a. Simple processing	Medium	12.3	Commission	V	V	V	V	V
			Own fabric	V	V	V	V	V
			Integrated	V	V	V	V	V
b. Complex processing	Medium	23.3	Commission	V	V	V	V	V
			Own fabric	V	V	V	M	M
			Integrated	V	V	V	V	V
c. Desizing	Medium	53.6	Commission	V	V	V	V	V
			Own fabric	V	V	V	V	V
			Integrated	V	V	V	V	V
5. Knit fabric finishing								
a. Simple processing	Medium	19.3	Commission	V	V	V	V	V
			Integrated	V	V	V	V	V
b. Complex processing	Medium	18.5	Commission	V	V	V	V	V
			Integrated	V	V	V	V	V
c. Hosiery products	Large	12.6	Own hosiery	V	V	V	V	V
			Integrated	V	V	V	V	V
6. Carpet finishing	Medium	48.6	Integrated	V	V	V	V	V
7. Stock & yarn finishing	Medium	9.8	Commission	M	C	C	C	C
			Own yarn	V	V	V	V	V
8. Nonwoven manufacturing	Large	56.7	N.A.	M	M	M	M	M
9. Felted fabric processing	Medium	4.4	N.A.	C	C	C	C	C

IX. THE REGULATORY FLEXIBILITY ACT

The Regulatory Flexibility Act passed by the 96th Congress requires that Federal agencies consider the differences in the scale of resources of regulated entities. The purpose of this chapter is to summarize the information contained elsewhere in the report relative to the Regulatory Flexibility Act and present the impacts on "small" plants and firms in a concise statement.

A. Definition of "Small" Textile Mills

The first step in completing the regulatory flexibility analysis is to define small entities for each subcategory. In 1979 the Small Business Administration proposed new size standards for small businesses by 4 digit SIC to replace the existing size standards. The existing standards shown in Table IX-1 vary by the government programs for which they are to be used such as: procurement, SBA loans and pollution control guaranties. Generally, the existing standards define "small" as firms with less than 250 to 1,000 employees, depending on the SIC and programs involved.

Congress delegated to SBA responsibility of defining small business with the general guidance that a small business concern is one which is independently owned and operated and not dominant in its field of operation. In arriving at the proposed standards, SBA first analyzed the level of concentration in each industry. An industry with a 4 firm concentration of greater than 50 percent was considered "concentrated." Competitive industries had basically equal distribution of sales and "mixed" industries were in between. For concentrated industries, proposed size standards were increased, for competitive industries size standards decreased and for mixed industries size standards were increased to increase competition.

SBA's proposed size standards are developed on the basis of the number of employees per firm; whereas the analysis contained in the previous chapters of this report is plant oriented, and the "small" model plants are based upon the size distribution of plants within an industry or industry segment independent of the size structure of the firms. However, according to the Census of Manufactures, an average of 66 percent of all the plants in the industry are single plant firms. This, of course, varies by SIC as well as by functional category. Thirty-four percent of all the plants (or mills) in the industry are members of multiplant companies. This group of plants account for about 77 percent of the total industry shipments and employ over 80 percent of all textile workers. Thus, in general, the smallest 66

Table IX-1. SBA existing and proposed size standard for small business in the textile mills industry

SIC		Proposed number of employees	Existing		
			Procurement	SBA loans	Pollution 1/ control guarantees
			employees		
2211:	Broad-woven fabric mills, cotton	2,500	1,000	1,000	1,000
2221:	Broad-woven fabric mills, man-made fiber and silk	2,500	500	500	500
2231:	Broad-woven fabric mills, wool (including dyeing and finishing)	500	500	250	250
2241:	Narrow fabrics and other smallwares mills: cotton, wool, silk, and man-made fiber	250	500	250	250
2251:	Women's full-length and knee-length hosiery	2,500	500	250	250
2252:	Hosiery, except women's full-length and knee-length hosiery	200	500	250	250
2253:	Knit outerwear mills	250	500	250	250
2254:	Knit underwear mills	2,500	500	250	250
2257:	Circular-knit fabric mills	2,500	500	250	250
2258:	Warp-knit fabric mills	1,000	500	250	250
2259:	Knitting mills, not elsewhere classified.	1,000	500	250	250
2261:	Finishers of broad-woven fabrics of cotton	2,500	1,000	500	500
2262:	Finishers of broad-woven fabrics of manmade fiber and silk	2,500	500	500	500
2269:	Finishers of textiles, not elsewhere classified	750	500	250	250
2271:	Woven carpets and rugs	2,500	750	750	750
2272:	Tufted carpets and rugs	250	500	500	500
2279:	Carpets and rugs, not elsewhere classified	1,000	500	500	500
2281:	Yarn spinning mills: Cotton, man-made fibers, and silk	2,500	500	500	500
2282:	Yarn texturizing, throwing, twisting, and winding mills: Cotton, manmade fibers and silk	2,500	500	250	250
2283:	Yarn mills, wool, including carpet and rug yarn	2,500	500	250	250
2284:	Thread mills	2,500	500	500	500
2291:	Felt goods, except woven felts and hats	2,500	500	250	250
2292:	Lace goods	250	500	250	250

continued . . .

Table IX-1. (continued)

SIC		Proposed number of employees	Existing: Procurement	Existing: SBA loans	Existing: Pollution control guaranties 1/
			employees	employees	employees
2293:	Paddings and upholstery filling	250	500	250	250
2294:	Processed waste and recovered fibers and flock	1,000	500	250	250
2295:	Coated fabrics, not rubberized	2,500	1,000	250	250
2296:	Tire cord and fabric	2,500	1,000	1,000	1,000
2297:	Nonwoven fabrics	2,500	500	250	250
2298:	Cordage and twine	500	500	250	250
2299:	Textile goods, not elsewhere calssified	250	500	250	250

Source: Small Business Administration "Proposed Size Standards Compared with Existing Size Standards Applicable to SBA Problems. Prepared for House of Representative Committees on Small Business. April, 1980.

percent of the firms in the industry would most likely be single plant firms and account for 25-30 percent of the total production.

The proposed SBA criteria for small businesses were compared to the number of employees by model plant category adjusting for the differences in the SIC and the functional code classification (which is the basis for the model plant structure). The results shown in Table IX-2 indicate that approximately 90 to 100 percent of the plants represented by the model plants would fall into the "small" category with the exception of SIC 2231 narrow fabric (67 percent). As a result the SBA definition was deemed impractical and an alternative definition of small business was developed for this analysis.

Traditionally in the model plant studies approximately one third of the total production of the industry has been approximated by plants in the "small" model category. Again, this varies by functional category. The goal of representing approximately 33 percent of the production consistent with the overall model plant structure was therefore the basis of the "small" plant structure defined in Table IX-3. The basis of the delineation is the number of employees.

The general structure of the "small" classification as used in this analysis defined more specifically as shown in Table IX-4. The percent of production represented by model plant size categories approximates the criteria set forth above reasonably well with the exception of the hosiery and carpet finishing segments. In the hosiery segment "small" plants represent 10 percent of the production and large plants represent the remaining 90 percent. Both the small and medium sized models were included as small. A similar situation exists for carpet manufacturers with "small" plants accounting for only 7 percent of total production. Further refinement of the small plant structure to bring it within closer alignment to the 33 percent criteria would require redefining the model plants involved.

B. Alternative Treatment Technology

A broad range of alternative treatment technologies for BAT and PSES guidelines were considered for both large and small plants. The alternatives considered were taken from the Development Document and were summarized on Table IX-5. These alternatives are then applied to the model plant structure shown on Tables IX-6 and IX-7.

Wool scouring - For the small wool scouring plants that are direct dischargers five alternatives were considered including:

Table IX-2. SBA proposed size standards and number of small business in the textile mills industry

SIC	Proposed number of employees	Total number of establishments	Number small plants	Percent small
2211: Broad-woven fabric mills, cotton	2,500	314	311	99
2221: Broad-woven fabric mills, man-made fiber and silk	2,500	449	446	99
2231: Broad-woven fabric mills, wool (including dyeing and finishing)	500	165	159	96
2241: Narrow fabrics and other smallwares mills: cotton, wool, silk & man-made fiber	250	42	28	67
2251: Women's full-length and knee-length hosiery	1,500	200	199	99
2252: Hosiery, except women's full-length and knee-length hosiery	200	415	359	87
2253: Knit outerwear mills	250	953	895	94
2254: Knit underwear mills	2,500	92	91	99
2257: Circular-knit fabric mills	2,500	530	530	100
2258: Warp-knit fabric mills	1,000	235	234	99
2259: Knitting mills, not elsewhere classified	1,000	192	192	100
2261: Finishers of broad-woven fabrics of cotton	2,500	210	209	99
2262: Finishers of broad-woven fabrics of man-made fiber and silk	2,500	285	284	99
2269: Finishers of textiles, not elsewhere classified	750	183	181	99
2271: Woven carpets and rugs	2,500	71	71	100
2272: Tufted carpets and rugs	250	449	391	87
2279: Carpets and rugs, not elsewhere classified	1,000	72	71	99
2281: Yarn spinning mills: cotton, man-made fibers and silk	2,500	456	455	99

Continued.....

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Table IX-2. (Continued)

SIC		Proposed number of employees	Total establishment	NR small plants	Percent small
2282:	Yarn texturizing, throwing, twisting, and winding mills: cotton, man-made fibers and silk	2,500	196	196	100
2283:	Yarn mills, wool, including carpet and rug yarn	2,500	76	76	100
2284:	Thread mills	2,500	70	70	100
2291:	Felt goods, except woven felts and hats	2,500	46	46	106
2292:	Lace goods	250	71	70	99
2293:	Paddings and upholstery filling	250	120	116	97
2294:	Processed waste and recovered fibers and flock	1,000	99	99	100
2295:	Coated fabrics, not rubberized	2,500	191	191	100
2296:	Tire cord and fabric	2,500	20	20	100
2297:	Non-woven fabrics	2,500	100	100	100
2298:	Cordage and twine	500	171	169	99
2299:	Textile goods, not elsewhere classified	250	436	434	99

Source: 1977 Census of Manufactures

Table IX-3. The textile industry employment criteria for small businesses, by functional category

	Employment
1. Wool scouring	200 and less
2. Wool finishing	400 and less
3. (Omitted)	
4. Woven fabric finishing	500 and less
5. Knit fabric finishing	
Other	410 and less
Hosiery	300 and less
6. Carpet finishing	400 and less
Direct dischargers	400 and less
Indirect dischargers	200 and less
7. Yarn finishing	200 and less
8. Nonwoven	100 and less
9. Felted fabric	150 and less

Source: DPRA

Table IX-4. The textile industry, general structure of small businesses; numbers of plants, employees, and production

Subcategory	Type discharge	Sub-division	Type plant	Daily capacity	Model plant size category	Number of small plants	Small plants as a percent of subcategory	Model plant production	Model plant production as a percent of subcategory	Number of employees per plant	Sales
							(%)	(1000 lb)	(%)		($1000)
1. Wool scouring	Direct		Commission	16.2	Small	2		5,800		116	1,600
			Commission	35.6	Medium	2		14,700		163	3,352
	Indirect		Commission	16.2	Small	7		5,800		28	904
Total						11	68.8	35,700	42.6		
2. Wool finishing	Direct		Integrated	18.6	Medium	1		8,800		391	33,686
	Indirect		Integrated	3.1	Small	21		1,400		195	7,039
Total						22	64.7	38,200	26.8		
3. Omitted											
4. Woven fabric finishing	Direct	Simple	Commission	5.4	Small	2		2,400		38	1,670
			Own fabric		Small	4		2,400		54	4,982
			Integrated		Small	8		2,400		239	9,244
			Commission	29.6	Medium	4		12,200		184	8,784
			Own fabric		Medium	1		13,900		491	29,023
		Complex	Commission	23.3	Small	1		9,600		145	6,912
		Desizing	Commission	21.4	Small	3		8,800		133	6,336
			Own fabric		Small	5		10,000		353	20,880
			Commission	53.6	Medium	1		22,100		476	21,216
			Integrated		Medium	6		25,100		499	71,986
	Indirect	Simple	Commission	2.4	Small	19		1,100		17	765
			Own fabric		Small	6		1,100		25	2,283
			Integrated		Small	28		1,100		109	4,237
			Commission	12.3	Medium	32		5,400		152	3,369
			Own fabric		Medium	17		5,400		134	11,210
			Integrated		Medium	27		5,400		231	23,133
			Commission	49.3	Large	4		20,400		440	19,584
			Integrated		Large	17		23,100		460	66,250
		Complex	Commission	9.7	Small	9		4,300		121	2,683
			Own fabric		Small	3		4,300		107	8,926
			Integrated		Small	11		4,300		185	18,421
			Commission	23.3	Medium	6		9,600		145	5,990
			Own fabric		Medium	6		10,900		385	22,759
		Desizing	Commission	21.4	Small	6		9,400		143	5,865
			Own fabric		Small	5		9,400		322	19,627
			Commission	53.6	Medium	4		22,100		476	21,216
			Integrated		Medium	1		25,100		499	71,986
Total						236	72.0	1,736,800	32.1		
5. Knit fabric finishing	Direct	Simple	Commission	8.0	Small	2		3,300		100	3,128
			Integrated		Small	8		3,300		271	15,087
			Commission	32.2	Medium	2		13,300		401	10,852
		Complex	Commission	7.7	Small	1		3,200		96	3,033
			Integrated		Small	5		3,600		295	16,459
			Integrated	18.5	Medium	6		8,700		405	40,194
	Indirect	Simple	Commission	1.6	Small	21		700		25	1,008
			Integrated		Small	56		700		113	2,721

continued...

Table IX-4. (Contined)

Subcategory	Type discharge	Sub-division	Type plant	Daily capacity	Model plant size category	Number of small plants	Small plants as a percent of subcategory (%)	Model plant production (1000 lb)	Model plant production as a percent of subcategory (%)	Number of employees per plant	Sales ($1000)
5. Knit fabric finishing (Continued)	Indirect		Commission	19.3	Medium	20		8,000		242	6,528
			Commission	32.2	Large	4		13,300		401	10,852
		Complex	Commission	7.7	Small	6		3,200		97	4,608
			Integrated		Medium	12		8,700		405	40,194
Total						160	94.7	591,300	27.5		
	Direct	Hosiery	Own hosiery	2.5	Small	1		1,100		124	3,880
			Own hosiery	5.5	Medium	1		2,400		150	15,379
	Indirect	Hosiery	Own hosiery	2.5	Small	14		1,100		138	5,187
			Own hosiery	5.5	Medium	2		2,400		150	15,379
Total						18	11.3	23,700	10.0		
6. Carpet finishing	Direct		Integrated	20.2	Small	3		6,700		360	
	Indirect		Integrated	8.9	Small	17		2,900		157	9,430
Total						20	30.4	49,300	7.0		
7. Stock & yarn finishing	Direct		Commission	9.8	Small	2		4,300		54	2,476
			Own yarn		Small	3		4,300		67	16,150
			Integrated		Small	15		4,600		142	7,286
	Indirect		Commission	4.3	Small	30		1,900		36	799
			Own yarn		Small	18		1,900		75	3,990
			Integrated		Small	44		2,000		62	3,168
			Commission	9.8	Medium	5		4,300		52	1,864
			Own yarn		Medium	14		4,300		142	8,410
			Integrated		Medium	27		4,600		142	7,286
			Commission	23.5	Large	2		7,700		133	3,690
Total						160	74.8	491,000	36.0		
8. Nonwoven manufacturing	Direct		N.A.	10.4	Small	3		4,600		104	7,948
	Indirect		N.A.	10.4	Small	18		4,600		104	10,267
Total						21	44.3	96,600	41.1		
9. Felted fabric processing	Indirect		N.A.	0.9	Small	5		400		148	4,123
			N.A.	10.7	Medium	2		5,000		44	2,040
Total						7	35.0	12,00	40.4		

Table IX-5. The textile industry, alternative treatment technologies existing sources (direct and indirect dischargers)

Technology		Description
A*	Direct	BPT - Screening, extended aeration activated sludge, sedimentation, and solids recycle to aeration basin
	Indirect	No treatment
B		Chemical coagulation and sedimentation
C		Multi-media filtration
D		Chemical coagulation, sedimentation and multi-media filtration
E		Multi-media filtration and granular activated carbon
F		Chemical coagulation, sedimentation, multi-media filtration and granular activated carbon
G		Ozonation
H		Chemical coagulation, sedimentation, and ozonation
I		Powdered activated carbon
J		Multi-media filtration and ozonation
K		Chemical coagulation, sedimentation, multi-media filtration, and ozonation
M**		Chemical coagulation and dissolved air flotation
N**		Chemical coagulation, dissolved air flotation, multi-media filtration, and granular activated carbon
P**		Chemical coagulation, dissolved air flotation, and ozonation

* Alternative A is generally considered in place; however Alternative A was considered for selected segments (see Table IX-6). All other alternatives are added on to A and for indirect dischargers include screening and equalization.

** Alternatives M, N, and P apply to wool scouring only.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table IX-6. The textile industry, wastewater control technology alternatives for large and small existing direct dischargers

Subcategory	Plant size category	A 1/	B	C	D	E	F	G	H	I	J	K	M	N	P
					Small Treatment Technologies (BAT)										
1. Wool scouring	Small		X	X									X	X	X
	Other		X	X									X	X	X
2. Wool finishing	Small		X		X		X	X	X	X		X			
	Other		X		X		X	X	X	X		X			
3. (Omitted)															
4. Woven fabric finishing															
a. Simple processing	Small		X	X	X	X	X	X	X	X	X	X			
	Other		X	X	X	X	X	X	X	X	X	X			
b. Complex processing	Small		X	X	X	X	X	X	X	X	X	X			
	Other		X	X	X	X	X	X	X	X	X	X			
c. Desizing	Small		X	X	X	X	X	X	X	X	X	X			
	Other		X	X	X	X	X	X	X	X	X	X			
5. Knit fabric finishing															
a. Simple processing	Small		X	X	X	X	X	X	X	X	X	X			
	Other		X	X	X	X	X	X	X	X	X	X			
b. Complex processing	Small		X	X	X	X	X	X	X	X	X	X			
	Other		X	X	X	X	X	X	X	X	X	X			
c. Hosiery products	Small	X	X	X	X		X	X	X	X		X			
	Other	X	X	X	X		X	X	X	X		X			
6. Carpet finishing	Small		X	X	X	X	X	X	X	X	X	X			
	Other		X	X	X	X	X	X	X	X	X	X			
7. Stock & yarn finishing	Small		X	X	X	X	X	X	X	X	X	X			
	Other		X	X	X	X	X	X	X	X	X	X			
8. Nonwoven manufacturing	Small	X	X	X	X	X	X	X	X	X	X	X			
	Other	X	X	X	X	X	X	X	X	X	X	X			
9. Felted fabric processing	Small	X	X		X		X	X	X	X		X			
	Other	X	X		X		X	X	X	X		X			

1/ Applicable only to hosiery products, nonwoven manufacturing, and felted fabric processing.

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

Table IX-7. The textile industry, wastewater control technology alternatives for large and small existing indirect dischargers

Subcategory	Plant size category	Alternative Treatment Technologies (PSES)							
		B	D	F	H	J	M	N	P
1. Wool scouring	Small								
	Other	X					X	X	X
2. Wool finishing	Small	X	X	X	X	X			
	Other	X	X	X	X	X			
3. (Omitted)									
4. Woven fabric finishing									
a. Simple processing	Small	X	X	X	X	X			
	Other	X	X	X	X	X			
b. Complex processing	Small	X	X	X	X				
	Other	X	X	X	X				
5. Knit fabric finishing									
a. Simple processing	Small	X	X	X	X	X			
	Other	X	X	X	X	X			
b. Complex processing	Small	X	X	X	X	X			
	Other	X	X	X	X	X			
c. Hosiery	Small	X	X	X	X	X			
	Other	X	X	X	X	X			
6. Carpet finishing	Small	X	X	X	X	X			
	Other	X	X	X	X	X			
7. Stock & yarn finishing	Small	X	X	X	X	X			
	Other	X	X	X	X	X			
8. Nonwoven manufacturing	Small	X	X	X	X	X			
	Other	X	X	X	X	X			
9. Felted & fabric processing	Small	X	X	X	X				
	Other	X	X	X	X				

Source: Effluent Guidelines Division, U.S. Environmental Protection Agency, Development Document.

C	Multi-media filtration
D	Chemical coagulation, sedimentation and multi media filtration
M	Chemical coagulation and dissolved air flotation
N	Chemical coagulation and dissolved air flotation multi-media filtration and granular activated carbon
P	Chemical coagulation, dissolved air flotation and ozonation

The alternatives for wool scouring indirect dischargers included three of the same technologies as direct dischargers (M, N, and P) plus Alternative B; chemical coagulation and sedimentation.

Wool finishing - Seven alternatives were considered for wool finishing direct dischargers. They are:

B	Chemical coagulation and sedimentation
D	Chemical coagulation, sedimentation and multi-media filtration
F	Chemical coagulation, sedimentation, multi-media filtration and granular activated carbon
G	Ozonation
H	Chemical coagulation, sedimentation and ozonation
I	Powdered activated carbon
K	Chemical coagulation, sedimentation, multi-media filtration and ozonation

Of the above alternatives B, D, F and H were also considered for pretreatment. In addition Alternative J, multi-media filtration and ozonation, was also considered for the wool finishing indirect dischargers.

Woven fabric finishing - In addition to the alternatives considered for wool finishing, three additional alternatives were considered for woven fabric finishing direct dischargers. These include:

C	Multi-media filtration
E	Multi-media filtration and granular activated carbon
J	Multi-media filtration and ozonation

The alternatives considered for indirect dischargers were identical to those alternatives considered for wool finishing.

Knit fabric finishing - The alternatives considered for both direct and indirect dischargers were the same as those considered for woven fabric finishing.

Carpet finishing - The alternatives considered for both direct and indirect dischargers were the same as those considered for woven fabric finishing.

Stock and yarn finishing - The alternatives considered for both direct and indirect dischargers were the same as those considered for woven fabric finishing.

Nonwoven manufacturing - The alternatives considered for both direct and indirect dischargers were the same as those considered for woven fabric finishing.

Felted fabric - The alternatives considered for felted fabric direct dischargers include:

A	BPT
B	Chemical coagulation and sedimentation
D	Chemical coagulation sedimentation and multi-media filtration
F	Chemical coagulation, sedimentation, multi-media filtration and granular activated carbon
G	Ozonation
H	Chemical coagulation, sedimentation and ozonation
I	Powdered activated carbon
K	Chemical coagulation, sedimentation, multi-media filtration and ozonation

Alternatives B, D, F and H were also considered for indirect dischargers.

C. Baseline Financial Conditions and Impacts for Resulting BAT and PSES

Baseline financial conditions for small plants are presented on Table IX-8 in contrast to "other" or larger plants in the segments. In general, larger plants are in a stronger financial condition than small plants. Although in many cases small plants would earn the same percentage return on sales or on assets, the associated cash flows and NPV are considerably smaller. The following discussion compares baseline conditions and impacts of the recommended BAT and PSES options by industry segment for small and large segments.

Wool scouring - The required price increase for BAT and PSES estimated small wool scouring plants ranges from 0.6 to 3.9 percent depending on the actual size of the "small" plants. The price increase required for the large models is only 0.4 percent. Under the recommended options the returns on sales become negative for all of the small models except one. For the two smallest models the returns reflect significant losses (in excess of 6 percent of sales). Two of the four small wool scouring models show negative cash flows in excess of $200,000 under the controls. The net present values for all of the small models become negative.

Wool finishing - The required price increase under effluent controls for the wool finishing segment varies from 0.5 to 1.0 percent for the two small models as compared to a range of 0.2 to 0.7 percent for the large models. The returns on sales of the small models are reduced to less than one percent while those of the large models vary between 0.9 and 3.4 percent. Annual cash flows for the smaller wool finishing model exceed $800,000; however, the cost of controls reduces it to about $600,000. The net present value of the smallest wool finishing model becomes negative under controls.

Table IX-8. The textile industry, financial effects of recommended options (BAT and PSES) on small businesses.

Subcategory	Type discharge	Sub-division	Type plant	Daily capacity	Required price increases	Return on Sales		Return on Assets		Cash Flows		Net Present Value	
						Baseline	After controls	Baseline	After controls	Baseline	After Control	Baseline	After Control
				(kkg)	(percent)					($1,000)			
1. Wool scouring	D (BAT)		Commission	16.2	1.0	-3.4	-6.0	-12.0	-21.0	-87	-249	-1,095	-1,661
			Commission	35.6	0.6	0.4	-0.9	1.2	- 1.8	356	231	-1,190	-1,728
	I (PSES)		Commission	16.2	3.9	3.6	-7.4	19.1	-30.9	155	-203	327	- 634
	Large Models				0.4-1.0	1.9-2.0	0.7-1.5	4.7-4.9	1.7-3.7	1,312 -1,438	927 -1,320	- 400 -1,237	-1,744 -1,664
2. Wool finishing	D		Integrated	18.6	0.5	1.2	0.7	9.4	5.7	2,865	2,259	3,525	1,368
	I		Integrated	3.1.	1.0	1.9	0.9	7.9	3.6	872	623	714	- 169
	Large Models				0.7-0.2	1.6-3.7	0.9-3.4	8.6-14.8	5.0-13.7	1,714- 19,248	1,332- 18,436	503- 39,581	861- 36,729
3. (Omitted)													
4. Woven fabric	D	Simple	Commission	5.4	1.0	1.8	-0.4	9.0	-1.6	182	68	339	- 85
			Commission	29.6	0.6	2.1	1.6	7.6	5.7	1,319	1,156	1,026	440
		Complex	Commission	23.3	0.7	2.2	1.5	7.7	5.2	1,042	876	693	98
		Desizing	Commission	21.4	0.8	2.4	1.6	11.3	7.5	926	760	723	128
			Commission	53.6	0.4	4.2	3.9	19.1	17.3	5,196	4,951	12,658	11,769
	I	Simple	Commission	2.4	4.8	1.9	-9.6	6.2	-24.9	95	-233	118	- 835
			Commission	12.3	1.2	2.5	0.1	11.8	0.8	500	248	649	- 261
			Commission	49.3	0.6	4.0	3.4	12.1	10.1	4,991	4,504	9,698	8,155
		Complex	Commission	9.7	1.5	2.5	-0.8	11.6	- 2.6	403	141	549	- 396
			Commission	23.3	1.1	2.2	0.4	7.8	1.6	905	551	752	- 497
		Desizing	Commission	21.4	1.2	2.4	0.6	11.4	3.0	859	505	681	- 568
			Commission	53.6	0.7	4.2	3.6	19.1	15.6	5,196	4,661	12,658	10,766
	Large Commission Models				0.3-0.4	2.0-4.1	1.8-3.8	7.4-14.6	6.4-13.3	5,484- 9,349	5,245- 8,530	3,157- 13,633	1,904- 10,752
	D	Simple	Own fabric	5.4	0.3	1.0	0.4	5.2	2.0	330	232	- 62	- 433
			Own fabric	29.6	0.2	1.5	1.3	6.9	6.1	2,793	2,630	2,408	1,823
		Desizing	Own fabric	21.4	0.2	1.5	1.3	7.0	5.8	2,014	1,849	1,688	1,093
	I	Simple	Own fabric	2.4	1.4	1.1	-2.6	6.1	-12.8	161	- 140	- 19	- 872
			Own fabric	12.3	0.6	1.7	1.1	8.0	5.1	1,341	1,090	1,798	909
		Complex	Own fabric	9.7	0.8	1.8	1.0	9.7	5.3	1,053	800	1,325	430
			Own fabric	23.3	0.4	1.5	1.1	8.2	5.8	2,159	1,805	2,379	1,130
		Desizing	Own fabric	21.4	0.5	1.4	1.0	6.9	4.5	1,887	1,533	1,822	573
	Large Own Fabric Models				0.1-0.3	2.0-3.0	1.8-2.9	7.4-11.3	6.8-10.6	5,824- 37,978	5,482- 36,787	3,157- 36,222	1,904- 32,049
	D	Simple	Integrated	5.4	0.3	2.3	2.0	9.8	8.5	1,267	1,169	2,005	1,660
		Desizing	Integrated	53.6	0.1	3.1	3.0	15.8	15.2	11,808	11,564	17,878	16,990
	I	Simple	Integrated	2.4	1.2	2.5	1.3	11.7	5.6	586	399	1,292	632
			Integrated	12.3	0.3	2.6	2.3	14.5	12.7	3,489	3,238	5,485	4,597
			Integrated	49.3	0.2	3.1	2.9	16.3	15.2	10,850	10,412	13,043	11,500
		Complex	Integrated	9.7	0.4	2.6	2.2	12.1	10.2	2,824	2,571	4,089	3,195
		Desizing	Integrated	53.6	0.2	3.0	2.8	10.9	10.1	12,264	11,729	13,888	11,997
	Large Integrated Models				0.1-0.3	2.7-3.1	2.4-3.0	10.4-15.8	9.2-13,9	5,506- 50,036	5,152- 49,589	5,801- 52,781	4,552- 51,136

(continued)

Table IX-8. (Continued)

Subcategory	Type discharge	Sub-division	Type plant	Daily capacity	Required price increases	Return on Sales Baseline	Return on Sales After controls	Return on Assets Baseline	Return on Assets After controls	Cash Flows Baseline	Cash Flows After Control	Net Present Value Baseline	Net Present Value After Control
				(kkg)	(percent)					($1,000)			
5. Knit fabric	D	Simple	Commission	8.0	1.1	2.7	1.6	8.8	5.0	559	442	772	343
			Commission	32.2	0.6	3.8	3.3	16.1	13.6	2,405	2,205	4,396	3,673
		Complex	Commission	7.7	1.2	2.7	1.5	8.8	4.9	543	425	753	319
	I	Simple	Commission	1.6	3.2	3.2	-4.6	13.4	-14.6	190	-70	344	- 449
			Commission	19.3	1.4	3.9	2.4	16.4	9.7	1,454	1,105	2,711	1,475
			Commission	32.2	1.1	3.8	2.7	16.1	11.1	2,405	1,960	4,189	2,649
		Complex	Commission	7.7	1.3	2.6	1.0	8.5	3.3	815	564	1,058	169
			Commission	18.5	1.5	3.9	2.4	16.4	9.4	1,383	1,031	2,584	1,342
	---------Large Commission Models---------				0.3-0.9	3.7-3.8	2.9-3.5	15.8-16.2	11.9-14.7	2,459-12,731	2,253 12,294	4,319-21,615	3,583-19,984
	D	Simple	Integrated	8.0	0.2	2.5	2.3	10.7	9.6	2,259	2,142	3,881	3,463
		Complex	Integrated	7.7	0.2	2.5	2.3	10.1	9.2	2,476	2,358	3,982	3,558
	I	Simple	Integrated	1.6	1.4	2.0	-0.4	9.7	-1.7	312	110	422	- 167
			Integrated	7.7	0.5	2.5	2.0	10.1	8.0	2,203	1,952	3,557	2,668
			Integrated	18.5	0.2	2.0	1.8	8.0	7.0	5,493	5,141	5,238	3,996
	---------Large Integrated Models---------				0.0-0.2	2.1-2.9	1.8-2.8	8.7-12.0	7.7-11.7	5,625-53,177	5,275-52,734	5,406-58,979	4,170-57,348
	D	Hosiery	Own hosiery	2.5	0.3	0.8	0.0	9.2	-0.4	165	61	143	- 225
			Own hosiery	5.5	0.2	2.0	1.8	9.2	8.3	1,592	1,493	1,531	1,183
	I	Hosiery	Own hosiery	2.5	0.8	1.2	0.0	7.3	0.1	421	233	399	- 302
			Own hosiery		0.4	2.0	1.6	6.1	4.9	1,611	1,401	939	199
	----------Large Hosiery Models-----------				0.2-0.5	1.9-3.1	1.4-2.8	7.1-22.0	5.0-19.7	1,102-4,375	941-4,124	380-9,661	-280-8,772
6. Carpet finishing	D		Integrated	8.9	0.6	2.4	1.8	9.9	7.2	1,335	1,125	2,672	1,931
	--------------Large Models--------------				0.1-0.3	1.7-2.7	1.4-2.6	8.4-14.7	7.2-13.9	3,059-9,270	2,941-9,025	5,956-21,266	5,532-20,378
7. Stock & yarn finishing	D		Commission	9.8	1.3	2.1	0.5	10.9	3.3	355	238	470	- 10
			Commission	4.3	5.2	2.4	-9.7	18.7	-47.2	102	-252	218	- 786
			Commission	9.8	2.5	3.2	-1.7	16.3	-5.2	366	106	807	- 173
			Commission	23.5	2.3	3.5	0.7	17.9	3.8	751	401	1,577	366
	All commission models were classified as small												
	D		Own yarn	9.6	0.2	1.0	0.8	6.4	5.0	1,052	935	- 235	- 654
	I		Own yarn	4.3	0.8	1.8	0.1	8.7	0.7	435	227	449	- 296
			Own yarn	9.6	0.8	1.6	0.8	6.3	2.9	868	618	766	- 117
	----------Large Own Yarn Models----------				0.3-0.4	2.3-3.1	1.8-2.8	8.9-13.2	7.1-11.6	2,382-8,340	2,032-7,799	2,929-16,639	2,343-14,733
	D		Integrated	9.8	0.2	1.0	0.8	6.4	5.0	1,052	935	- 235	- 654
	I		Integrated	4.3	1.1	2.1	0.0	12.3	0.4	403	194	745	- 24
			Integrated	9.8	0.9	2.0	1.0	11.5	5.7	901	652	1,505	622
	---------Large Integrated Models---------				0.1-0.5	2.2-2.6	1.7-2.5	8.6-10.6	7.1-9.6	1,874-11,741	2,119-11,502	3,624-16,435	2,388-15,565

Continued.....

Table IX-8. (Continued)

Subcategory	Type discharge	Sub-division	Type plant	Daily capacity	Required price increases	Return on Sales Baseline	Return on Sales After controls	Return on Assets Baseline	Return on Assets After controls	Cash Flows Baseline	Cash Flows After Control	Net Present Value Baseline	Net Present Value After Control
				(kkg)	(percent)					($1,000)			
8. Nonwoven manufacturing	D		N.A.	10.4	0.3	2.6	2.2	14.4	12.3	1,209	1,111	2,281	1,934
	I		N.A.	10.4	0.6	2.6	2.0	14.7	11.2	1,553	1,344	2,588	1,817
	Large Models				0.1-0.3	2.3-3.1	2.1-2.9	7.3-13.8	6.8-12.9	3,102- 9,933	2,984- 9,581	4,961- 14,393	4,072- 13,151
9. Felted fabric processing	I		N.A.	0.9	1.2	5.3	4.1	13.0	9.7	1,194	1,007	2,279	1,619
			N.A.	10.7	3.1	1.2	-7.0	7.5	-33.7	159	- 499	79	-1,557
	Large Models				0.7-1.1	2.0-5.3	1.2-4.3	6.6-13.0	4.2-10.2	1,039- 1,194	856- 1,042	1,022- 2,279	128- 1,739

Woven fabric finishing - The financial effects vary significantly between types of plants (commission, own fabric and integrated). Required price increases average 1.2 percent for small commission mills and 0.3 for large mills. A similar pattern exists for own fabric and intregrated mills. Return on assets average 10.4 percent for small plants under baseline conditions but dropped to an average of 6.2 percent with the imposition of controls (or a decrease of 40 percent). This compares to a decline of 30 percent for large plants. A similar pattern exists for the other indicators. Both the cash flows and the net present values of the small integrated models remain positive after controls but in some cases do drop to negative levels for commission and own fabric mills.

Knit fabric finishing - exclusive of hosiery products. The price increase required by the small commission mills in the segment range from 0.6 percent to a 3.2 percent with all but one model (simple processing) requiring an increase of greater than 1.0 percent. In contrast the price increase required by the large commission mills are less than 1.0 percent. The simple commission mills and simple integrated mills experience a negative net present value resulting from pollution controls and it is estimated the simple commission mill will also experience a negative cash flow after controls. The remaining small commission models have cash flows varying from $400 thousand to over $2 million.

The small integrated knit fabric models have relatively low required increases when compared to the commission models. The small integrated models require an increase of 1.4 percent compared to 3.2 percent for the small commission model. The remainder of the small integrated models require increases of less than 0.6 (three requiring only a 0.2 percent increase). None of the large models require increases greater than 0.2 percent. The cash flows of the small integrated models are all positive under controls ranging from a low of about $100 thousand to a high of over $5 million. The smallest model has a negative net present value while the other small models remain positive after controls.

Knit fabric finishing - hosiery - Required price increases in the hosiery subdivision range from 0.2 percent to 0.8 percent for the small models (all of which are own hosiery models). The returns on sales for the two smallest models approach zero; the returns for the other small hosiery models are less than 2 percent. Cash flows for the small models range from a low of $60,000 to a high of over $1,400,000. The two smallest models have negative net present values. Large models demonstrate required price increases of .2 to .5 percent. All cash flows and NPVs remain positive after controls.

Carpet finishing - The single small model requires a price increase of only 0.6 percent under effluent controls. Its return on sales is reduced from 2.4 percent under baseline to 1.8 percent under controls. Its cash flow is reduced from a baseline level of $1,335,000 to $1,125,000 under controls. Its net present value remains positive under the costs of the recommended technology. Large models require a price increase of 0.1 to 0.3 percent: All other indicators remain positive after controls.

Stock and yarn finishing - All of the small commission models reflect substantial impacts from costs of the recommended options. Required price increases range from 1.3 percent to over 5 percent. Two of the commission models have negative returns on sales after controls while the other two have returns less than one percent. The smallest commission model has a negative cash flow while the other models have flows of less than $500,000. All but one of the models has a negative net present value under controls.

The required price increases for the small own yarn models vary from 0.2 percent to 0.8 percent compared with 0.3 - 0.4 for large models. The returns on sales for these models are all less than two percent under baseline. Under controls they become less than one percent. Cash flows for these small models range from about $200,000 to nearly one million dollars. All three of the small own yarn models have negative net present values after the imposition of effluent controls whereas the large models remain positive.

The required price increases for the small integrated models vary from 0.2 percent for the largest to over one percent for the smallest. The returns on sales for two of the small models are greatly reduced. The smallest model has its return reduced from 2.1 percent to zero percent. One of the small models has its returns reduced from a baseline rate of 2.0 percent to 1.0 percent under controls. The cash flow of the small integrated yarn model is reduced from $400,000 under baseline to less than $200,000 under controls. Two of the three models have negative net present values with the imposition of controls. The large integrated models have required price increases ranging from 0.1 to 0.5; again none of the other indicators are reduced to a negative position.

Nonwoven fabric manufacturing - The impacts on the financial profiles of the small nonwoven fabric models are relatively minor in comparison to those on the other subcategories. The two small models have required price increases of 0.3 percent and 0.5 percent. The returns on sales remain at about 2 percent under controls while the cash flows are in excess of one million dollars. Impacts on large nonwoven plants are less with required price increases of 0.1 to 0.3 percent. Return on sales remain above 2 percent and cash flows remain at $3 million or above.

Felted fabric processing - The financial impacts are relatively minor on the smaller of the two small felted fabric processing mills but severe on the larger. The larger model would require a price increase of 3.1 percent under controls and would have a negative return on sales, a negative cash flow and a negative net present value under controls. 1/ Impacts on the large model plant indicate a required price increase ranging from 0.7 to 1.1 percent; all other indicators remain positive.

1/ It should be pointed out that the plants represented by this model are not expected to be required to install BAT Controls because of the characteristics of the effluent.

D. Production and Employment Impacts

The recommended options result in substantial impacts on the small plant group as shown in Table IX-9 and summarized below.

Plant closures resulting from the imposition of effluent control technology fall most heavily on small plants. For example, there are 149 direct dischargers (after baseline closures) required to install controls. Of this number 62 mills are classified as "small" and 87 as "large". However, 6 small plants are projected to close or 10 percent of the small direct dischargers compared with 3 percent of the large plants.

Projected Plant Closures - BAT
(After baseline closures)

Segment	Total plants requiring controls	Small mills		Large mills	
		Plants requiring controls	Projected closures	Plants requiring controls	Projected closures
Wool scouring	3	2	2	1	1
Wool finishing	6	1	-	5	2
Woven fabric	61	19	1	42	-
Knit fabric-Other	31	19	-	12	-
Knit fabric-Hosiery	6	2	1	4	-
Carpet	6	-	-	6	-
Stock & yarn	30	16	2	14	-
Non woven	5	3	-	2	-
Felted fabric	1	-	-	1	-
	149	62	6	87	3

A similar pattern exists for indirect dischargers. A total of 125 mills (after baseline closures) are required to install pretreatment facilities; 64 of these are small plants. However, 35 small plants (or 55 percent) are projected to close. For large plants, 17 out of 61 (28 percent) are projected to close.

Textiles IX-9. The textile industry, projected economic impacts of recommended options (BAT and PSES) on small businesses.

Subcategory	Type discharge	Sub-division	Daily capacity	Type plant	Number of plants requiring controls (after baseline closures)	Projected closures	Model plant employees (per plant)	Total employment loss	Model plant production	Production displaced
									(1000 lbs)	(1,000,000 lbs)
1. Wool scouring	D		16.2	Commission	1	1	116	116	5,800	5.8
			35.6	Commission	1	1	163	163	14,700	14.7
	I		16.2	Commission	5	5	28	140	5,800	29.0
Total						7		419		49.5
2. Wool finishing	D		18.6	Integrated	1	-	391	-	8,800	-
	I		3.1	Integrated	12	6	195	1,170	1,400	8.4
Total						6		1,170		8.4
3. (Omitted)										
4. Woven fabric	D	Simple	5.4	Commission	1	1	38	38	2,400	2.4
				Own fabric	-	-	54	-	2,400	-
				Integrated	4	-	239	-	2,400	-
			29.6	Commission	3	-	184	-	12,200	-
				Own fabric	-	-	491	-	13,900	-
		Complex	23.3	Commission	1	-	145	-	9,600	-
		Desizing	21.4	Commission	2	-	133	-	8,800	-
				Own fabric	3	-	353	-	10,000	-
			53.6	Commission	1	-	476	-	22,100	-
				Integrated	4	-	499	-	25,100	-
	I	Simple	2.4	Commission	-	-	17	-	1,100	-
				Own fabric	-	-	25	-	1,100	-
				Integrated	-	-	109	-	1,100	-
			12.3	Commission	-	-	152	-	5,400	-
				Own fabric	-	-	134	-	5,400	-
				Integrated	-	-	231	-	5,400	-
			49.3	Commission	-	-	440	-	20,400	-
				Integrated	-	-	460	-	23,100	-
		Complex	9.7	Commission	3	3	121	363	4,300	12.9
				Own fabric	1	-	107	-	4,300	-
				Integrated	4	-	185	-	4,300	-
			23.3	Commission	2	1	145	145	9,600	9.6
				Own fabric	2	-	385	-	10,900	-
		Desizing	21.4	Commission	3	3	143	429	9,400	28.2
				Own fabric	3	-	322	-	9,400	-
			53.6	Commission	2	-	476	-	22,100	-
				Integrated	1	-	499	-	25,100	-
Total						8		975		53.1

Continued.....

Table IX-9. (Continued)

Subcategory	Type discharge	Sub-division	Daily capacity	Type plant	Number of plants requiring controls (after baseline closures)	Projected closures	Model plant employees (per plant)	Total employment loss	Model plant production (1000 lbs)	Production displaced (1,000,000 lbs)
5. Knit fabric finishing	D	Simple	8.0	Commission	1	-	100	-	3,300	-
				Integrated	6	-	271	0	3,300	-
			32.2	Commission	2	-	401	-	13,300	-
		Complex	7.7	Commission	1	-	96	-	3,200	-
				Integrated	4	-	295	-	3,600	-
			18.5	Integrated	5	-	405	-	8,700	-
	I	Simple	1.6	Commission	-	-	25	-	700	-
				Integrated	-	-	113	-	700	-
			19.3	Commission	-	-	242	-	8,000	-
			32.2	Commission	-	-	401	0	13,300	-
		Complex	7.7	Commission	-	-	97	-	3,200	-
				Integrated	-	-	263	-	3,200	-
			18.5	Commission	-	-	229	-	7,600	-
				Integrated	-	-	405	-	8,700	-
Total						-	-		-	-
	D	Hosiery	2.5	Own hosiery	1	1	124	124	1,100	1.1
			5.5	Own hosiery	1	-	150		2,400	-
	I	Hosiery	2.5	Own hosiery	3	3	138	414	1,100	3.3
			5.5	Own hosiery	1	-	150		2,400	-
Total						4		538		4.4
6. Carpet finishing	I		8.9	Integrated	-	-	157	-	2,900	-
Total						-	-		-	
7. Stock & yarn finishing	D		9.8	Commission	2	1	54	54	4,300	4.3
				Own yarn	1	1	67	67	4,300	4.3
				Integrated	13	-	142	-	4,600	-
	I		4.3	Commission	5	5	36	180	1,900	9.5
				Own yarn	3	3	75	225	1,900	5.7
				Integrated	7	4	62	248	2,000	8.0
			9.8	Commission	1	1	52	52	4,300	4.3
				Own yarn	1	1	142	142	4,300	4.3
				Integrated	4	-	142	-	4,600	-
			23.5	Commission	1	-	133	-	7,700	-
Total						16		968		40.4
8. Nonwoven manufacturing	D		10.4	N.A.	3	-	104	-	4,600	-
	I		10.4	N.A.	-	-	104	-	4,600	-
9. Felted fabric processing	I		0.9	N.A.	-	-	148	-	400	-
			10.7	N.A.	-	-	44	-	5,000	-
Total						-	-		-	

Projected Plant Closures - PSES
(After baseline closures)

Segment	Total plants requiring controls	Small mills: Plants requiring controls	Small mills: Projected closures	Large mills: Plants requiring controls	Large mills: Projected closures
Wool scouring	7	5	5	2	2
Wool finishing	15	12	6	3	-
Woven fabric	35	21	7	14	-
Knit fabric-Other	-	-	-	-	-
Knit fabric-Hosiery	40	4	3	36	15
Carpet	-	-	-	-	-
Stock & yarn	28	22	14	6	-
Nonwoven	-	-	-	-	-
Felted fabric	-	-	-	-	-
Total	125	64	35	61	17

Production loss as indicated below is substantial. Of the total capacity lost due to the imposition of effluent control guidelines, approximately 54 percent is due to the closures of small plants. A total level of 287.5 million pounds of production is associated with projected plant closures (small and large). Over 30 million pounds are associated with the small direct dischargers and 123 million pounds with the small indirect dischargers for a total of 156 million pounds. The remaining 60 million pounds of lost production capacity results from the projected closures of large plants.

Projected Production Loss

	Small plants					
	Direct discharger		Indirect discharger			
Subcategory	plants closing	capacity loss	plants closing	capacity loss	Total capacity loss	Total capacity loss
		(1,000,000 lbs)		--------(1,000,000 lb)------		
Wool scouring	2	20.5	5	29.0	49.5	156.6
Wool finishing	-	-	6	8.4	8.4	15.0
Woven fabric finishing	1	2.4	7	50.7	53.1	53.1
Knit fabric-other	-	-	-	-	-	-
Knit fabric-hosiery	1	1.1	3	3.3	4.4	22.4
Carpet finishing	-	-	-	-	-	-
Stock & yarn finishing	2	8.6	14	31.8	40.4	40.4
Nonwoven manufacturing	-	-	-	-	-	-
Felted fabric processing	-	-	-	-	-	-
Total	6	32.6	35	123.2	155.8	287.5

The total employment loss due to effluent controls is projected to be approximately 11,500 workers. Thirty-seven percent of these can be attributed to the closing of small plants. The employment loss among the small direct dischargers is 648 while that of the small indirect dischargers is 3,626 for a total loss among the small plants of 4,274 workers. The loss due to the closing of large plants is projected to be 7,222 with most of this resulting from the closing of 15 integrated hosiery mills classified as large.

Projected Employment Loss

Subcategory	Small plants					Total employment loss
	Direct dischargers		Indirect dischargers		Total employment loss	
	Plants closing	Employment loss	Plants closing	Employment loss		
Wool scouring	2	279	5	140	419	1,666
Wool finishing	-	-	6	1,170	1,170	2,030
Woven fabric finishing	1	38	7	1,055	1,093	1,093
Knit fabric-other	-	-	-	-	-	-
Knit fabric-hosiery	1	124	3	414	538	5,653
Carpet finishing	-	-	-	-	-	-
Stock & yarn finishing	2	207	14	847	1,054	1,054
Nonwoven manufacturing	-	-	-	-	-	-
Felted fabric processing	-	-	-	-	-	-
	6	648	35	3,626	4,274	11,496

X. ANNUAL SOCIAL COST

A. Introduction

Under Executive Order No. 12291, a regulatory impact analysis is required to be conducted in order to assess total costs to be incurred by society due to Federal regulatory actions. These social costs are defined as:

> The value of goods and services lost by society resulting from the uses of resources to comply with a regulation, the use of resources to implement a regulation, and reductions in output in lieu of compliance.

B. Components of the Social Cost

The use of a static, partial equilibrium analytical framework is conceptually the most effective means for estimating total social costs. This method is based on an analysis of supply and demand relationships in the directly affected markets. When an industry is regulated, compliance requirements result in increased unit costs of production. This, in turn, leads to an upward shift in the industry's supply curve, which normally results in higher prices and lower production levels.

Other costs to society that result from a regulatory action would include the costs of implementing and enforcing a regulation - commonly identified as federal, state and local government costs for developing, implementing and enforcing a regulatory action. Additional social costs would include the productivity effects, i.e. the shift in the use of resources from investments in facilities, equipment and technology to improve productivity to those used in achieving environmental goals. Costs incurred by society in reallocating resources that become unemployed in the regulatory actions are also included in this category.

C. Calculations of the Social Costs of Effluent Guidelines for the Textile Mills Industry, Point Source Category

In the analysis of the impacts of the recommended effluent guidelines on the textile industry it was concluded that there would be no major shift in the long term supply curve resulting in any significant increases in prices or reduction in quantities produced. It was concluded that actual measurement of the supply curve shifts--considering the limited nature of the estimated compliance costs and number of subsector analysis that would be required--would not be practical. Consequently, an alternative method has been considered. This methodology considers the estimated compliance costs directly as the real resource costs with other costs theoretically measurable under the supply curve shift: production losses and net welfare loss, as unconsequential.

These real resource costs are normally calculated as the net present value of the resources to be used directly in complying with the regulation using a 10 percent real discount rate. To obtain an annual social cost, the above value is annualized. This annual social cost can be approximated by the expression:

$$\text{Annual Social Cost} = (.1)\,(\text{Investment}) + \text{Operating and Maintenance Expenses}$$

From cost data contained in Chapter VII, total investment for the recommended options was calculated as \$124 million and total O&M expenses as \$41 million. Substituting in the above expression, the annual social cost was estimated to be \$53 million.

XI. LIMITS OF THE ANALYSIS

There is a considerable amount published information available covering the structure and economic data of the textile industry at the major (or total) and the minor (or weaving and finishing, knitting, other textile products) industry levels and also by the SIC industries. However, there was very little published information available which addressed the industry under the functional classification system used in this study. This chapter discusses the general accuracy of the report and some of the key assumptions involved.

A. General Accuracy

The data and other information used in this study were drawn from published governmental reports, the industry data collection portfolio, and from extensive contacts with individual mills. Information on the status of effluent discharge and on recommended wastewater control systems and costs were furnished by EPA. Every effort was made to verify the data and other information used.

Detailed data on size distribution within each subcategory was provided by EPA. Size distributions by type mill were based primarily on the industry surveys.

Financial aspects of the impact analysis were based on synthesized costs and returns for "representative" types of model plants. These costs and returns were developed from a variety of sources including published research from universities and government agencies, information obtained from the data collection portfolio, and published financial performance data.

Throughout the study, an effort was made to evaluate the data and other information used and to update these materials wherever possible. Checks were made with informed sources in industry and government to help assure that the data and information were as reliable and as representative as possible. For example, construction costs, working capital requirements, proportions of capital financed through debt and equity, and profitability ratios were checked with the appropriate persons in industry firms who are experienced and knowledgeable in these matters. Efforts were made to use the latest data available.

Specifications of the contract required the Contractor to use effluent control costs provided by EPA. The Effluent Guidelines Division, EPA, and the technical contractor provided recommended alternative effluent control systems, investment costs and annual operating costs adapted to the types and sizes of "representative" model plants used in this analysis.

Given the accuracy of the wastewater control costs, it is believed that this study's analysis represents a useful and accurate evaluation of the economic impact of the guidelines.

B. Range of Error

Different data series and different sections of the analysis will have different possible ranges of error.

Estimated data error ranges expressed as an average for the industry were as follows. These were based on review of the variability in survey data and estimates of possible error in interpretation and application of published and unpublished information.

	Error Range (Percent)
1. Information regarding the organization and structure of the industry, number, location and size of plants, and other information descriptive of industry segments	± 10
2. Price information for products and raw materials	± 15
3. Cost information for plant investments and operating costs	± 20
4. Financial information concerning the industry	± 15

C. Critical Assumptions

In an economic impact analysis of any industry, it is inevitable that simplifying assumptions must be made to bring the problem into a framework of analysis consistent with the constraints of time, budget, and data availability. The major critical assumptions used in this analysis were as follows:

1. Types and sizes of the model plants were representative of plants actually existing in the industry and of plants expected to be built in the future.

2. The financial data were representative of costs and returns for existing plants and new plants to be constructed after promulgation of guidelines. As stated earlier, the model plant financial data are based on 1979 dollars and were adjusted to reflect future economic activity (inflation).

3. Levels of profitability reflected in model plant profiles (based generally on 1973-1977 economic conditions and adjusted to base year 1979) would remain essentially the same but would reflect the future economic activity (inflation).

4. The economic impacts of wastewater controls on those products not included in the detailed analysis of "representative" plants could be evaluated in general terms by associating them with "representative" model plants. This association was based primarily on the fact that models were developed for single product plants that represented a majority of an industry segment's production. In most cases, there were actual plants producing products in similar combinations as those described in the model plants.

5. Wastewater control costs and control status estimates were supplied by the Effluent Guidelines Division, EPA. It was assumed these data were realistic in terms of:

    (a) applicability of effluent treatment systems recommended,

    (b) investment and annual operating costs for systems, and

    (c) percentage of total number of plants which have treatment in place for each industry segment and for the industry in general as reported in the Development Document.

APPENDIX A

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SELECTED REFERENCES

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APPENDIX B INDEX

Model Plant Financial Profiles

Source	Discharge	Subcategory (type processing)	Type plant	Table No.
Existing	Direct	Wool scouring	Commission	B-1
		Wool finishing	Integrated	B-2
		Woven fabric finishing		---
		(Simple)	Commission	B-3
			Own fabric	B-4
			Integrated	B-5
		(Complex)	Commission	B-6
			Own fabric	B-7
			Integrated	B-8
		(Desizing)	Commission	B-9
			Own fabric	B-10
			Integrated	B-11
		Knit fabric finishing		---
		(Simple)	Commission	B-12
			Integrated	B-13
		(Complex)	Commission	B-14
			Integrated	B-15
		(Hosiery products)	Own hosiery	B-16
			Integrated	B-17
		Carpet finishing	Integrated	B-18
		Stock & yarn finishing	Commission	B-19
			Own yarn	B-20
			Integrated	B-21
		Nonwoven manufacturing	N.A.	B-22
		Felted fabric processing	N.A.	B-23
Existing	Indirect	Wool scouring	Commission	B-24
		Wool finishing	Integrated	B-25
		Woven fabric finishing		---
		(Simple)	Commission	B-26
			Own fabric	B-27
			Integrated	B-28
		(Complex)	Commission	B-29
			Own fabric	B-30
			Integrated	B-31
		(Desizing)	Commission	B-32
			Own fabric	B-33
			Integrated	B-34
		Knit fabric finishing		---
		(Simple)	Commission	B-35
			Integrated	B-36
		(Complex)	Commission	B-37
			Integrated	B-38
		(Hosiery products)	Own hosiery	B-39
			Integrated	B-40

Appendix B Index (Continued)

Source	Discharge	Subcategory (type processing)	Type plant	Table No.
Existing	Indirect	Carpet finishing	Integrated	B-41
		Stock & yarn finishing	Commission	B-42
			Own yarn	B-43
			Integrated	B-44
		Nonwoven manufacturing	N.A.	B-45
		Felted fabric processing	N.A.	B-46
New	Direct	Wool finishing	Integrated	B-47
		Woven fabric finishing		---
		(Simple)	Commission	B-48
			Own fabric	B-49
			Integrated	B-50
		(Complex)	Commission	B-51
			Own fabric	B-52
			Integrated	B-53
		(Desizing)	Commission	B-54
			Own fabric	B-55
			Integrated	B-56
		Knit fabric finishing		---
		(Simple)	Commission	B-57
			Integrated	B-58
		(Complex)	Commission	B-59
			Integrated	B-60
		(Hosiery products)	Own hosiery	B-61
		Carpet finishing	Integrated	B-62
		Stock & yarn finishing	Commission	B-63
			Own yarn	B-64
		Nonwoven manufacturing	N.A.	B-65
New	Indirect	Wool finishing	Integrated	B-66
		Woven fabric finishing		---
		(Simple)	Commission	B-67
			Own fabric	B-68
			Integrated	B-69
		(Complex)	Commission	B-70
			Own fabric	B-71
			Integrated	B-72
		(Desizing)	Commission	B-73
			Own fabric	B-74
			Integrated	B-75
		Knit fabric finishing		---
		(Simple)	Commission	B-76
			Integrated	B-77
		(Complex)	Commission	B-78
			Integrated	B-79
		(Hosiery products)	Own hosiery	B-80
			Integrated	B-81

Appendix B Index (Continued)

Source	Discharge	Subcategory (type processing)	Type plant	Table No.
New	Indirect	Carpet finishing	Integrated	B-82
		Stock & yarn finishing	Commission	B-83
			Own yarn	B-84
		Nonwoven manufacturing	N.A.	B-85
		Felted fabric processing 1/	N.A.	B-86

1/ Applicable both to direct and indirect models.

Appendix Table B-1. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Wool Scouring TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct

	Small (16.2 kkg/day)		Medium (35.6 kkg/day)		Large (81.0 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	1,600.8	100.0	3,351.6	100.0	8,139.6	100.0
COSTS:						
Textile Materials	0.0	0.0	0.0	0.0	0.0	0.0
Direct Labor	558.7	34.9	1,246.8	37.2	2,059.3	25.3
Indirect Labor	76.8	4.8	261.4	7.8	1,074.4	13.2
Other	987.7	61.7	1,736.1	51.8	4,460.5	54.8
TOTAL	1,623.2	101.4	3,244.3	96.8	7,594.2	93.3
CASH EARNINGS	-22.4	-1.4	107.3	3.2	545.4	6.7
LESS:						
Depreciation	41.6	2.6	107.3	3.2	415.1	5.1
Interest	0.0	0.0	0.0	0.0	8.2	0.1
PRE-TAX INCOME	-64.0	-4.0	0.0	0.0	122.1	1.5
INCOME TAX	0.0	0.0	0.0	0.0	36.9	0.5
AFTER-TAX INCOME	-64.0	-4.0	0.0	0.0	85.2	1.0
CASH FLOW	-22.4	-1.4	107.3	3.2	500.3	6.1

Appendix Table B-2. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Wool finishing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct

	Small (7.4 kkg/day)		Medium (18.6 kkg/day)		Large (37.3 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	16,513.2	100.0	33,686.4	100.0	99,750.0	100.0
COSTS:						
Textile Materials	6,489.7	39.3	12,362.9	36.7	37,206.8	37.3
Direct Labor	2,807.3	17.0	3,537.1	10.5	10,473.8	10.5
Indirect Labor	1,222.0	7.4	3,806.6	1.3	11,271.8	11.3
Other	5,267.6	31.9	13,979.8	41.5	32,019.5	32.1
TOTAL	15,786.6	95.6	32,238.0	95.7	90,971.9	91.2
CASH EARNINGS	726.6	4.4	7,448.4	4.3	8,778.1	8.8
LESS:						
Depreciation	231.2	1.4	235.8	0.7	1,396.6	1.4
Interest	132.1	0.8	909.5	2.7	1,596.0	1.6
PRE-TAX INCOME	363.3	2.2	303.1	0.9	5,785.5	5.8
INCOME TAX	147.9	0.9	120.2	0.4	2,642.1	2.6
AFTER-TAX INCOME	215.4	1.3	182.9	0.5	3,143.4	3.2
CASH FLOW	446.6	2.7	418.7	1.2	4,540.0	4.6

Appendix Table B-3. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct

	Small (5.4 kkg/day)		Medium (29.6 kkg/day)		Large (73.9 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	1,670.4	100.0	8,784.0	100.0	18,360.0	100.0
COSTS:						
Textile Materials	0.0	0.0	0.0	0.0	0.0	0.0
Direct Labor	302.3	18.1	2,064.2	23.5	4,406.4	24.0
Indirect Labor	132.0	7.9	825.7	9.4	2,772.4	15.1
Other	1,165.9	69.8	5,367.1	61.1	9,088.2	49.5
TOTAL	1,600.2	95.8	8,257.0	94.0	16,267.0	88.6
CASH EARNINGS	70.2	4.2	527.0	6.0	2,093.0	11.4
LESS:						
Depreciation	21.7	1.3	307.4	3.5	789.5	4.3
Interest	18.4	1.1	8.8	0.1	495.7	2.7
PRE-TAX INCOME	30.1	1.8	210.8	2.4	807.8	4.4
INCOME TAX	5.3	0.3	77.7	0.9	352.3	1.9
AFTER-TAX INCOME	24.8	1.5	133.1	1.5	455.5	2.5
CASH FLOW	46.5	2.8	440.5	5.0	1,245.0	6.8

Appendix Table B-4. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Direct

	Small (5.4 kkg/day)		Medium (29.6 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	4,982.4	100.0	29,023.2	100.0
COSTS:				
Textile Materials	3,457.8	69.4	17,413.9	60.0
Direct Labor	353.8	7.1	3,192.6	11.0
Indirect Labor	308.9	6.2	3,627.9	12.5
Other	742.3	14.9	3,685.9	12.7
TOTAL	4,862.8	97.6	27,920.3	96.2
CASH EARNINGS	119.6	2.4	1,102.9	3.8
LESS:				
Depreciation	49.8	1.0	406.3	1.4
Interest	5.0	0.1	0.0	0.0
PRE-TAX INCOME	64.8	1.3	696.6	2.4
INCOME TAX	13.7	0.3	301.2	1.0
AFTER-TAX INCOME	51.1	1.0	395.4	1.4
CASH FLOW	100.9	2.0	801.7	2.8

Appendix Table B-5. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct

	Small (5.4 kkg/day)		Medium (29.6 kkg/day)		Large (73.9 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	9,244.8	100.0	45,240.0	100.0	99,519.6	100.0
COSTS:						
Textile Materials	3,753.4	40.6	19,453.2	43.0	68,469.5	68.8
Direct Labor	1,849.0	20.0	8,821.8	19.5	6,369.3	6.4
Indirect Labor	342.1	3.7	1,809.6	4.0	1,194.2	1.2
Other	2,745.7	29.7	11,852.9	26.2	16,420.7	16.5
TOTAL	8,690.2	94.0	41,937.5	92.7	92,453.7	92.9
CASH EARNINGS	554.6	6.0	3,302.5	7.3	7,065.9	7.1
LESS:						
Depreciation	129.4	1.4	1,221.5	2.7	2,089.9	2.1
Interest	129.4	1.4	452.4	1.0	0.0	0.0
PRE-TAX INCOME	295.8	3.2	1,628.6	3.6	4,976.0	5.0
INCOME TAX	116.8	1.3	729.9	1.6	2,269.7	2.3
AFTER-TAX INCOME	179.0	1.9	898.7	2.0	2,706.3	2.7
CASH FLOW	308.4	3.3	2,120.2	4.7	4,796.2	4.8

Appendix Table B-6. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct

	Small (23.3 kkg/day)		Medium (116.3 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	6,912.0	100.0	39,240.0	100.0
COSTS:				
Textile Materials	0.0	0.0	0.0	0.0
Direct Labor	1,624.3	23.5	9,221.4	23.5
Indirect Labor	649.7	9.4	3,688.6	9.4
Other	4,223.3	61.1	23,975.6	61.1
TOTAL	6,497.3	94.0	36,885.6	94.0
CASH EARNINGS	414.7	6.0	2,354.4	6.0
LESS:				
Depreciation	241.9	3.5	1,373.4	3.5
Interest	7.0	0.1	39.2	0.1
PRE-TAX INCOME	165.8	2.4	941.8	2.4
INCOME TAX	57.0	0.8	414.0	1.1
AFTER-TAX INCOME	108.8	1.6	527.8	1.3
CASH FLOW	350.7	5.1	1,901.2	4.8

Appendix Table B-7. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Own TYPE OF DISCHARGER: Direct

	Medium (116.3 kkg/day)	
	($000)	(Percent)
SALES	117,720.0	100.0
COSTS:		
Textile Materials	70,632.0	60.0
Direct Labor	12,949.2	11.0
Indirect Labor	14,715.0	12.5
Other	13,302.4	11.3
TOTAL	111,598.6	94.8
CASH EARNINGS	6,121.4	5.2
LESS:		
Depreciation	2,589.8	2.2
Interest	0.0	0.0
PRE-TAX INCOME	3,531.6	3.0
INCOME TAX	1,605.3	1.4
AFTER-TAX INCOME	1,926.3	1.6
CASH FLOW	4,516.1	3.8

Appendix Table B-8. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct

	Small (23.3 kkg/day)		Medium (116.3 kkg/day)		Large (193.8 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	37,932.0	100.0	142,203.6	100.0	290,282.4	100.0
COSTS:						
Textile Materials	16,310.8	43.0	77,358.7	54.4	157,913.6	54.4
Direct Labor	7,396.8	19.5	19,766.3	13.9	40,349.3	13.9
Indirect Labor	1,517.3	4.0	7,963.4	5.6	16,255.8	5.6
Other	9,938.2	26.2	26,734.2	18.8	54.573.1	18.8
TOTAL	35,163.1	92.7	131,822.6	92.7	269,091.8	92.7
CASH EARNINGS	2,768.9	7.3	10,381.0	7.3	21,190.6	7.3
LESS:						
Depreciation	1,024.2	2.7	2,986.3	2.1	6,095.9	2.1
Interest	379.3	1.0	284.4	0.2	580.6	0.2
PRE-TAX INCOME	1,365.4	3.6	7,110.3	5.0	14,504.1	5.0
INCOME TAX	608.8	1.6	3,251.5	2.3	6,657.2	2.3
AFTER-TAX INCOME	756.6	2.0	3,858.8	2.7	7,856.9	2.7
CASH FLOW	1,780.8	4.7	6,845.1	4.8	13,952.8	4.8

Appendix Table B-9. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing   TYPE OF PLANT: Commission   TYPE OF DISCHARGER: Direct

	Small (21.4 kkg/day)		Medium (53.6 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	6,336.0	100.0	21,216.0	100.0
COSTS:				
Textile Materials	0.0	0.0	0.0	0.0
Direct Labor	1,489.0	23.5	5,091.8	24.0
Indirect Labor	595.6	9.4	3,203.6	15.1
Other	3,871.2	61.1	10,502.0	49.5
TOTAL	5,955.8	94.0	18,797.4	88.6
CASH EARNINGS	380.2	6.0	2,418.6	11.4
LESS:				
Depreciation	221.8	3.5	912.2	4.3
Interest	6.4	0.1	572.9	2.7
PRE-TAX INCOME	152.0	2.4	933.5	4.4
INCOME TAX	50.7	0.8	410.2	1.9
AFTER-TAX INCOME	101.3	1.6	523.3	2.5
CASH FLOW	323.1	5.1	1,435.5	6.8

Appendix Table B-10. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Direct

	Small (21.4 KKg/day)		Medium (53.6 KKg/day)		Large (178.5 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	20,880.0	100.0	52,107.6	100.0	180,576.0	100.0
COSTS:						
Textile Materials	12,528.0	60.0	31,264.6	60.0	108,345.6	60.0
Direct Labor	2,296.8	11.0	5,731.8	11.0	19,863.4	11.0
Indirect Labor	2,610.0	12.5	6,513.5	12.5	22,572.0	12.5
Other	2,651.8	12.7	5,262.9	10.1	20,405.1	11.3
TOTAL	20,086.6	96.2	48,772.8	93.6	171,186.1	94.8
CASH EARNINGS	793.4	3.8	3,334.8	6.4	9,389.9	5.2
LESS:						
Depreciation	292.3	1.4	1,146.4	2.2	3,972.7	2.2
Interest	0.0	0.0	416.9	0.8	0.0	0.0
PRE-TAX INCOME	501.1	2.4	1,771.5	3.4	5,417.2	3.0
INCOME TAX	211.3	1.0	795.6	1.5	2,472.7	1.4
AFTER-TAX INCOME	289.8	1.4	975.9	1.9	2,944.5	1.6
CASH FLOW	582.1	2.8	2,122.3	4.1	6,917.2	3.8

Appendix Table B-11. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct

	Small (21.4 KKg/day)		Medium (53.6 KKg/day)		Large (178.5 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	34,800.0	100.0	71,986.8	100.0	152,992.8	100.0
COSTS:						
Textile Materials	14,964.0	43.0	49,526.9	68.8	83,228.1	54.4
Direct Labor	6,786.0	19.5	11,877.8	16.5	21,266.0	13.9
Indirect Labor	1,392.0	4.0	2,951.5	4.1	8,567.6	5.6
Other	9,117.6	26.2	2,519.5	3.5	28,726.6	18.8
TOTAL	32,259.6	92.7	66,875.7	92.9	141,824.3	92.7
CASH EARNINGS	2,540,4	7.3	5,111.1	7.1	11,168.5	7.3
LESS:						
Depreciation	939.6	2.7	1,511.7	2.1	3,212.9	2.1
Interest	348.0	1.0	0.0	0.0	306.0	0.2
PRE-TAX INCOME	1,252.8	3.6	3,599.4	5.0	7,649.6	5.0
INCOME TAX	557.0	1.6	1,636.5	2.3	3,499.6	2.3
AFTER-TAX INCOME	695.8	2.0	1,962.9	2.7	4.150.0	2.7
CASH FLOW	1,635.4	4.7	3,474.6	4.8	7,362.9	4.8

Appendix Table B-12. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-simple processing TYPE OF PLANT: Commision TYPE OF DISCHARGER: Direct

	Small (8.0 kkg/day)		Medium (32.2 kkg/day)		Large (160.8 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	3,128.4	100.0	10,852.8	100.0	57,854.4	100.0
COSTS:						
Textile Materials	0.0	0.0	0.0	0.0	0.0	0.0
Direct Labor	1,238.8	39.6	2,094.6	19.3	11,165.9	19.3
Indirect Labor	137.6	4.4	2,333.4	21.5	12,438.7	21.5
Other	1,526.7	48.8	5,361.3	49.4	28,580.1	49.4
TOTAL	2,903.1	92.8	9,789.3	90.2	52,184.7	90.2
CASH EARNINGS	225.3	7.2	1,063.5	9.8	5,669.7	9.8
LESS:						
Depreciation	125.1	4.0	510.1	4.7	2,719.2	4.7
Interest	18.8	0.6	130.2	1.2	694.3	1.2
PRE-TAX INCOME	81.4	2.6	423.2	3.9	2,256.2	3.9
INCOME TAX	19.3	0.6	175.4	1.6	1,018.6	1.8
AFTER-TAX INCOME	62.1	2.0	247.8	2.3	1,237.6	2.1
CASH FLOW	187.2	6.0	757.9	7.0	3,956.8	6.8

Appendix Table B-13. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-simple processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct

	Small (8.0 kkg/day)		Medium (32.2 kkg/day)		Large (160.8 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	15,087.6	100.0	68,940.0	100.0	325,856.4	100.0
COSTS:						
Textile Materials	9,173.3	60.8	19,579.0	28.4	92,543.2	28.4
Direct Labor	1,493.7	9.9	6,273.5	9.1	29,652.9	9.1
Indirect Labor	1,961.4	13.0	482.6	0.7	2,281.0	0.7
Other	1,493.7	9.9	37,848.1	54.9	178,895.2	54.9
TOTAL	14,122.1	93.6	64,183.2	93.1	303,372.3	93.1
CASH EARNINGS	965.5	6.4	4,756.8	6.9	22,484.1	6.9
LESS:						
Depreciation	301.8	2.0	1,447.7	2.1	6,843.0	2.1
Interest	120.7	0.8	68.9	0.1	325.9	0.1
PRE-TAX INCOME	543.0	3.6	3,240.2	4.7	15,315.2	4.7
INCOME TAX	230.5	1.5	1,471.2	2.1	7,025.7	2.2
AFTER-TAX INCOME	312.5	2.1	1,769.0	2.6	8,289.5	2.5
CASH FLOW	614.3	4.1	3,216.7	4.7	15,132.5	4.6

Appendix Table B-14. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-complex processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct

	Small (7.7 kkg/day)		Large (30.9 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	3,033.6	100.0	11,097.6	100.0
COSTS:				
Textile Materials	0.0	0.0	0.0	0.0
Direct Labor	1,201.3	39.6	2,141.8	19.3
Indirect Labor	133.5	4.4	2,386.0	21.5
Other	1,480.4	48.8	5,482.2	49.4
TOTAL	2,815.2	92.8	10,010.0	90.2
CASH EARNINGS	218.4	7.2	1,087.6	9.8
LESS:				
Depreciation	121.3	4.0	521.6	4.7
Interest	18.2	0.6	133.2	1.2
PRE-TAX INCOME	78.9	2.6	432.8	3.9
INCOME TAX	18.3	0.6	179.8	1.6
AFTER-TAX INCOME	60.6	2.0	253.0	2.3
CASH FLOW	181.9	6.0	774.6	7.0

Appendix Table B-15. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-complex processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct

	Small (7.7 kkg/day)		Medium (18.5 kkg/day)		Large (30.9 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	16,459.2	100.0	40,194.0	100.0	66,182.4	100.0
COSTS:						
Textile Materials	10,007.2	60.8	23,071.4	57.4	18,795.8	28.4
Direct Labor	1,629.5	9.9	2,894.0	7.2	6,022.6	9.1
Indirect Labor	2,139.7	13.0	2,492.0	6.2	463.3	0.7
Other	1,629.5	9.9	9,445.6	23.5	36,334.1	54.9
TOTAL	15,405.9	93.6	37,903.0	94.3	61,615.8	93.1
CASH EARNINGS	1,053.3	6.4	2,291.0	5.7	4,566.6	6.9
LESS:						
Depreciation	329.2	2.0	844.1	2.1	1,389.8	2.1
Interest	131.7	0.8	281.4	0.7	66.2	0.1
PRE-TAX INCOME	592.4	3.6	1,165.5	2.9	3,110.6	4.7
INCOME TAX	253.3	1.5	516.9	1.3	1,411.6	2.1
AFTER-TAX INCOME	339.2	2.1	648.6	1.6	1,699.0	2.6
CASH FLOW	668.3	4.1	1,492.7	3.7	3,088.8	4.7

Appendix Table B-16. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-hosiery TYPE OF PLANT: Own hosiery TYPE OF DISCHARGER: Direct

	Small (2.5 kkg/day)		Medium (5.5 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	3,880.8	100.0	15,379.2	100.0
COSTS:				
Textile Materials	1,959.8	50.5	7,766.5	50.5
Direct Labor	970.2	25.0	1,491.8	9.7
Indirect Labor	155.2	4.0	353.7	2.3
Other	737.4	19.0	5,105.9	33.2
TOTAL	3,822.6	98.5	14,717.9	95.7
CASH EARNINGS	58.2	1.5	661.3	4.3
LESS:				
Depreciation	19.4	0.5	138.4	0.9
Interest	0.0	0.0	0.0	0.0
PRE-TAX INCOME	38.8	1.0	522.9	3.4
INCOME TAX	7.0	0.2	221.3	1.4
AFTER-TAX INCOME	31.8	0.8	301.6	2.0
CASH FLOW	51.2	1.3	440.0	2.9

Appendix Table B-17. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-hosiery   TYPE OF PLANT: Integrated   TYPE OF DISCHARGER: Direct

	Small (2.5 kkg/day)	
	($000)	(Percent)
SALES	9,964.8	100.0
COSTS:		
Textile Materials	2,780.2	27.9
Direct Labor	2,222.2	22.3
Indirect Labor	617.8	6.2
Other	3,547.5	35.6
TOTAL	9,167.7	92.0
CASH EARNINGS	797.1	8.0
LESS:		
Depreciation	458.4	4.6
Interest	0.0	0.0
PRE-TAX INCOME	338.7	3.4
INCOME TAX	136.6	1.4
AFTER-TAX INCOME	202.1	2.0
CASH FLOW	660.5	6.6

Appendix Table B-18. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Carpet Finishing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct

	Small (20.2 KKg/day)		Medium (48.6 KKg/day)		Large (121.5 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	21,788.4	100.0	47,998.8	100.0	62,244.0	100.0
COSTS:						
Textile Materials	10,458.4	48.0	28,895.3	60.2	31,495.5	50.6
Direct Labor	2,157.1	9.9	1,824.0	3.8	4,979.5	8.0
Indirect Labor	1,111.2	5.1	1,152.0	2.4	1,120.4	1.8
Other	6,754.4	31.0	13,535.7	28.2	20,540.5	33.0
TOTAL	20,481.1	94.0	45,407.0	94.6	58,135.9	93.4
CASH EARNINGS	1,307.3	6.0	2,591.8	5.4	4,108.1	6.6
LESS:						
Depreciation	348.6	1.6	528.0	1.1	809.2	1.3
Interest	174.3	0.8	672.0	1.4	684.7	1.1
PRE-TAX INCOME	784.4	3.6	1,391.8	2.9	2,614.2	4.2
INCOME TAX	341.6	1.6	621.0	1.3	1,183.3	1.9
AFTER-TAX INCOME	442.8	2.0	770.8	1.6	1,430.9	2.3
CASH FLOW	791.4	3.6	1,298.8	2.7	2,240.1	3.6

Appendix Table B-19. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct

	Small (9.8 kkg/day)	
	($000)	(Percent)
SALES	2,476.8	100.0
COSTS:		
Textile Materials	0.0	0.0
Direct Labor	517.7	20.9
Indirect Labor	304.6	12.3
Other	1,456.4	58.8
TOTAL	2,278.7	92.0
CASH EARNINGS	198.1	8.0
LESS:		
Depreciation	116.4	4.7
Interest	19.8	0.8
PRE-TAX INCOME	61.9	2.5
INCOME TAX	12.8	0.5
AFTER-TAX INCOME	49.1	2.0
CASH FLOW	165.5	6.7

Appendix Table B-20. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing TYPE OF PLANT: Own yarn TYPE OF DISCHARGER: Direct

	Small (9.8 KKg/day)		Medium (23.4 KKg/day)		Large (39.1 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	16,150.8	100.0	16,438.8	100.0	27,610.8	100.0
COSTS:						
Textile Materials	10,772.6	66.7	8,811.2	53.6	14,799.4	53.6
Direct Labor	775.2	4.8	1,528.8	9.3	2,567.8	9.3
Indirect Labor	129.2	0.8	230.1	1.4	386.6	1.4
Other	4,070.0	25.2	4,865.9	29.6	8,172.8	29.6
TOTAL	15,747.0	97.5	15,436.0	93.9	25,926.6	93.9
CASH EARNINGS	403.8	2.5	1,002.8	6.1	1,684.2	6.1
LESS:						
Depreciation	177.6	1.1	361.7	2.2	607.4	2.2
Interest	0.0	0.0	98.6	0.6	165.7	0.6
PRE-TAX INCOME	226.2	1.4	542.5	3.3	911.1	3.3
INCOME TAX	84.8	0.5	230.3	1.4	399.9	1.4
AFTER-TAX INCOME	141.4	0.9	312.2	1.9	511.2	1.9
CASH FLOW	319.0	2.0	673.9	4.1	1,118.6	4.1

Appendix Table B-21. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing   TYPE OF PLANT: Integrated   TYPE OF DISCHARGER: Direct

	Small (9.8 kkg/day)		Medium (23.5 kkg/day)		Large (39.1 kkg/day)		X-Large (58.6 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	7,286.0	100.0	21,252.0	100.0	49,238.4	100.0	73,590.0	100.0
COSTS:								
Textile Materials	3,014.0	42.6	11,624.8	54.7	29,001.4	58.9	43.344.5	58.9
Direct Labor	1,260.5	17.3	4,122.9	19.4	6,745.7	13.7	10,081.8	13.7
Indirect Labor	276.9	3.8	658.8	3.1	935.5	1.9	1,398.2	1.9
Other	2,266.1	31.1	3,740.4	17.6	9,109.1	18.5	13,614.2	18.5
TOTAL	6,907.5	94.8	20,146.9	94.8	45,791.7	93.0	68,438.7	93.0
CASH EARNINGS	378.9	5.2	1,105.1	5.2	3,446.7	7.0	5,151.3	7.0
LESS								
Depreciation	204.0	2.8	85.0	0.4	935.5	1.9	1,398.2	1.9
Interest	36.4	0.5	340.0	1.6	689.3	1.4	1,030.3	1.4
PRE-TAX INCOME	138.5	1.9	680.1	3.2	1,821.8	3.7	2,722.8	3.7
INCOME TAX	44.5	0.6	293.6	1.4	818.8	1.7	1,233.2	1.7
AFTER-TAX INCOME	94.0	1.3	386.5	1.8	1,003.0	2.0	1,489.6	2.0
CASH FLOW	298.0	4.1	471.5	2.2	1,938.5	3.9	2,887.8	3.9

Appendix Table B-22. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Nonwoven manufacturing TYPE OF PLANT: Not available TYPE OF DISCHARGER: Direct

	Small (10.4 kkg/day)		Medium (23.6 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	7,948.8	100.0	23,760.0	100.0
COSTS:				
Textile Materials	2,869.5	36.1	12,141.4	51.1
Direct Labor	794.9	10.0	2,423.5	10.2
Indirect Labor	190.8	2.4	1,211.8	5.1
Other	3,553.1	44.7	6,652.8	28.0
TOTAL	7,408.3	93.2	22,429.5	94.4
CASH EARNINGS	540.5	6.8	1,330.5	5.6
LESS:				
Depreciation	198.7	2.5	285.1	1.2
Interest	111.3	1.4	190.1	0.8
PRE-TAX INCOME	230.5	2.9	855.3	3.6
INCOME TAX	86.8	1.1	374.2	1.6
AFTER-TAX INCOME	143.7	1.8	481.1	2.0
CASH FLOW	342.4	4.3	766.2	3.2

Appendix Table B-23. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Felted fabric processing TYPE OF PLANT: Not applicable TYPE OF DISCHARGER: Direct

	Small (0.9 kkg/day)		Medium (2.0 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	4,123.2	100.0	5,475.6	100.0
COSTS:				
Textile Materials	1,204.0	29.2	1,396.3	25.5
Direct Labor	808.1	19.6	1,210.1	22.1
Indirect Labor	441.2	10.7	416.1	7.6
Other	1,150.4	27.9	2,015.0	36.8
TOTAL	3,603.7	87.4	5,037.6	92.0
CASH EARNINGS	519.5	12.6	438.0	8.0
LESS:				
Depreciation	115.4	2.8	153.3	2.8
Interest	74.2	1.8	125.9	2.3
PRE-TAX INCOME	329.9	8.0	158.8	2.9
INCOME TAX	132.5	3.2	53.8	1.0
AFTER-TAX INCOME	197.4	4.8	105.0	1.9
CASH FLOW	312.8	7.6	258.3	4.7

Appendix Table B-24. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Wool scouring TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect

	Small (16.2 kkg/day)		Large (81.0 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	904.8	100.0	8,139.6	100.0
COSTS:				
Textile Materials	0.0	0.0	0.0	0.0
Direct Labor	181.0	20.0	2,059.3	25.3
Indirect Labor	99.5	11.0	1,074.4	13.2
Other	565.5	62.5	4,517.5	55.5
TOTAL	846.0	93.5	7,651.2	94.0
CASH EARNINGS	58.8	6.5	488.4	6.0
LESS:				
Depreciation	23.5	2.6	260.5	3.2
Interest	0.9	0.1	0.0	0.0
PRE-TAX INCOME	34.4	3.8	227.9	2.8
INCOME TAX	6.1	0.7	85.6	1.1
AFTER-TAX INCOME	28.3	3.1	142.3	1.7
CASH FLOW	51.8	5.7	402.8	4.9

Appendix Table B-25. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Wool finishing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (3.1 kkg/day)		Medium (18.6 kkg/day)		Large (37.3 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	7,039.2	100.0	50,160.0	100.0	99,750.0	100.0
COSTS:						
Textile Materials	2,717.1	38.6	18,709.7	37.3	37,206.8	37.3
Direct Labor	1,302.3	18.5	5,266.8	10.5	10,473.8	10.5
Indirect Labor	415.3	5.9	5,668.1	11.3	11,271.8	11.3
Other	2,238.4	31.8	16,101.3	32.1	32,019.5	32.1
TOTAL	6,673.1	94.8	45,745.9	91.2	90,971.9	91.2
CASH EARNINGS	366.1	5.2	4,414.1	8.8	8,788.1	8.8
LESS:						
Depreciation	126.7	1.8	702.2	1.4	1,396.6	1.4
Interest	84.5	1.2	802.6	1.6	1,596.0	1.6
PRE-TAX INCOME	154.9	2.2	2,909.3	5.8	5,785.5	5.8
INCOME TAX	52.0	0.7	1,319.0	2.6	2,642.1	2.6
AFTER-TAX INCOME	102.9	1.5	1,590.3	3.2	3,143.4	3.2
CASH FLOW	229.6	3.3	2,292.5	4.6	4,540.0	4.6

Appendix Table B-26 The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect

	Small (2.4 kkg/day)		Medium (12.3 kkg/day)		Large (49.3 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	765.6	100.0	3,369.6	100.0	19,584.0	100.0
COSTS:						
Textile Materials	0.0	0.0	0.0	0.0	0.0	0.0
Direct Labor	138.6	18.1	913.2	27.1	4,700.2	24.0
Indirect Labor	60.5	7.9	195.4	5.8	2,957.2	15.1
Other	534.4	69.8	2,058.8	61.1	9,694.0	49.5
TOTAL	733.5	95.8	3,167.4	94.0	17,351.4	88.6
CASH EARNINGS	32.1	4.2	202.2	6.0	2,232.6	11.4
LESS:						
Depreciation	10.0	1.3	117.9	3.5	842.2	4.3
Interest	8.4	1.1	6.7	0.2	528.7	2.7
PRE-TAX INCOME	13.7	1.8	77.6	2.3	861.7	4.4
INCOME TAX	2.3	0.3	17.8	0.5	377.1	1.9
AFTER-TAX INCOME	11.4	1.5	59.8	1.8	484.6	2.5
CASH FLOW	21.4	2.8	177.7	5.3	1,326.8	6.8

Appendix Table B-27. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing - simple processing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Indirect

	Small (2.4 KKg/day)		Medium (12.3 KKg/day)		Large (49.3 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	2,283.6	100.0	11,210.4	100.0	47,955.6	100.0
COSTS:						
Textile Materials	1,578.5	69.1	7,780.0	69.4	28,773.4	60.0
Direct Labor	161.4	7.1	795.9	7.1	5,275.1	11.0
Indirect Labor	141.0	6.2	695.0	6.2	5,994.5	12.5
Other	348.0	15.2	1,367.7	12.2	4,843.5	10.1
TOTAL	2,228.9	97.6	10,638.6	94.9	44,886.5	93.6
CASH EARNINGS	54.7	2.4	571.8	5.1	3,069.1	6.4
LESS:						
Depreciation	22.8	1.0	246.6	2.2	1,055.0	2.2
Interest	2.3	0.1	123.3	1.1	383.6	0.8
PRE-TAX INCOME	29.6	1.3	201.9	1.8	1,630.5	3.4
INCOME TAX	5.2	0.2	73.6	0.6	730.8	1.5
AFTER-TAX INCOME	24.4	1.1	128.3	1.2	899.7	1.9
CASH FLOW	47.2	2.1	374.9	3.4	1,954.7	4.1

Appendix Table B-28. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing - simple processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (2.4 KKg/day)		Medium (12.3 KKg/day)		Large (49.3 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	4,237.2	100.0	23,133.6	100.0	66,250.8	100.0
COSTS:						
Textile Materials	1,720.3	40.6	10,919.1	47.2	45,580.6	68.8
Direct Labor	847.4	20.0	1,943.2	8.4	4,240.1	6.4
Indirect Labor	156.8	3.7	879.1	3.8	795.0	1.2
Other	1,258.4	29.7	7,796.0	33.7	10,931.4	16.5
TOTAL	3,982.9	94.0	21,537.4	93.1	61,547.1	92.9
CASH EARNINGS	254.3	6.0	1,596.2	6.9	4,703.7	7.1
LESS:						
Depreciation	59.3	1.4	370.1	1.6	1,391.3	2.1
Interest	59.3	1.4	393.3	1.7	0.0	0.0
PRE-TAX INCOME	135.7	3.2	832.8	3.6	3,312.4	5.0
INCOME TAX	43.2	1.0	363.8	1.6	1,504.5	2.3
AFTER-TAX INCOME	92.5	2.2	469.0	2.0	1,807.9	2.7
CASH FLOW	151.8	3.6	839.1	3.6	3,199.2	4.8

Appendix Table B-29. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing - complex processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect

	Small (9.7 kkg/day)		Medium (23.3 kkg/day)		Large (116.3 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	2,683.2	100.0	5,990.4	100.0	49,248.0	100.0
COSTS:						
Textile Materials	0.0	0.0	0.0	0.0	0.0	0.0
Direct Labor	727.1	27.1	1,407.8	23.5	7,928.9	16.1
Indirect Labor	155.7	5.8	563.1	9.4	5,959.0	12.1
Other	1,639.4	61.1	3,660.1	61.1	31,223.2	63.4
TOTAL	2,522.2	94.0	5,631.0	94.0	45,111.1	91.6
CASH EARNINGS	161.0	6.0	359.4	6.0	4,136.9	8.4
LESS:						
Depreciation	94.0	3.5	209.6	3.5	1,723.7	3.5
Interest	5.4	0.2	6.0	0.1	837.2	1.7
PRE-TAX INCOME	61.6	2.3	143.8	2.4	1,576.0	3.2
INCOME TAX	12.7	0.5	46.9	0.8	705.7	1.4
AFTER-TAX INCOME	48.9	1.8	96.9	1.6	870.3	1.8
CASH FLOW	142.9	5.3	306.5	5.1	2,594.0	5.3

Appendix Table B-30. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing - complex processing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Indirect

	Small (9.7 kkg/day)		Medium (23.3 kkg/day)		Large (116.3 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	8,926.8	100.0	22,759.2	100.0	117,720.0	100.0
COSTS:						
Textile Materials	6,195.2	69.4	13,655.5	60.0	70,632.0	60.0
Direct Labor	633.8	7.1	2,503.5	11.0	12,949.2	11.0
Indirect Labor	553.4	6.2	2,844.9	12.5	14,715.0	12.5
Other	1,089.1	12.2	2,890.5	12.7	13,302.4	11.3
TOTAL	8,471.5	94.9	21,894.4	96.2	111,598.6	94.8
CASH EARNINGS	455.3	5.1	864.8	3.8	6,121.4	5.2
LESS:						
Depreciation	196.4	2.2	318.6	1.4	2,589.8	2.2
Interest	98.2	1.1	0.0	0.0	0.0	0.0
PRE-TAX INCOME	160.7	1.8	546.2	2.4	3,531.6	3.0
INCOME TAX	54.7	0.6	232.0	1.0	1,605.3	1.4
AFTER-TAX INCOME	106.0	1.2	314.2	1.4	1,926.3	1.6
CASH FLOW	302.4	3.4	632.8	2.8	4,516.1	3.8

Appendix Table B-31. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing - complex processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (9.7 kkg/day)		Medium (23.3 kkg/day)		Large (116.6 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	18,421.2	100.0	37,932.0	100.0	151,074.0	100.0
COSTS:						
Textile Materials	8,694.8	47.2	16,310.8	43.0	82,184.3	54.4
Direct Labor	1,547.4	8.4	7,396.7	19.5	20,999.3	13.9
Indirect Labor	700.0	3.8	1,517.3	4.0	8,460.1	5.6
Other	6,208.0	33.7	9,938.1	26.2	28,401.9	18.8
TOTAL	17,150.2	93.1	35,162.9	92.7	140,045.5	92.7
CASH EARNINGS	1,271.0	6.9	2,769.1	7.3	11,028.5	7.3
LESS:						
Depreciation	294.7	1.6	1,024.2	2.7	3,172.6	2.1
Interest	313.2	1.7	379.3	1.0	302.2	0.2
PRE-TAX INCOME	663.1	3.6	1,365.6	3.6	7,553.7	5.0
INCOME TAX	285.8	1.6	608.9	1.6	3,455.5	2.3
AFTER-TAX INCOME	377.3	2.0	756.7	2.0	4,098.2	2.7
CASH FLOW	672.0	3.6	1,780.9	4.7	7,270.8	4.8

Appendix Table B-32. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing

TYPE OF PLANT: Commission

TYPE OF DISCHARGER: Indirect

	Small (21.4 kkg/day)		Medium (53.6 kkg/day)	
	($000)	(Percent)	($000)	(Percent)
SALES	5,865.6	100.0	21,216.0	100.0
COSTS:				
Textile Materials	0.0	0.0	0.0	0.0
Direct Labor	1,378.4	23.5	5,091.8	24.0
Indirect Labor	551.4	9.4	3,203.6	15.1
Other	3,583.8	61.1	10,502.0	49.5
TOTAL	5,513.6	94.0	18,797.4	88.6
CASH EARNINGS	352.0	6.0	2,418.6	11.4
LESS:				
Depreciation	205.3	3.5	912.2	4.3
Interest	5.9	0.1	572.9	2.7
PRE-TAX INCOME	140.8	2.4	933.5	4.4
INCOME TAX	45.5	0.8	410.2	1.9
AFTER-TAX INCOME	95.3	1.6	523.3	2.5
CASH FLOW	300.6	5.1	1,435.5	6.8

Appendix Table B-33. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing - desizing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Indirect

	Small (21.4 KKg/day)		Medium (53.6 KKg/day)		Large (178.5 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	19,627.2	100.0	52,107.6	100.0	180,576.0	100.0
COSTS:						
Textile Materials	11,776.3	60.0	31,264.6	60.0	108,345.6	60.0
Direct Labor	2,159.0	11.0	5,731.8	11.0	19,863.4	11.0
Indirect Labor	2,453.4	12.5	6,513.5	12.5	22,572.0	12.5
Other	2,492.7	12.7	5,262.9	10.1	20,405.1	11.3
TOTAL	18,881.4	96.2	48,772.8	93.6	171,186.1	94.8
CASH EARNINGS	745.8	3.8	3,334.8	6.4	9,389.9	5.2
LESS:						
Depreciation	274.8	1.4	1,146.4	2.2	3,972.7	2.2
Interest	0.0	0.0	416.9	0.8	0.0	0.0
PRE-TAX INCOME	471.0	2.4	1,771.5	3.4	5,417.2	3.0
INCOME TAX	197.4	1.0	795.6	1.5	2,472.7	1.4
AFTER-TAX INCOME	273.6	1.4	975.9	1.9	2,944.5	1.6
CASH FLOW	548.4	2.8	2,122.3	4.1	6,917.2	3.8

Appendix Table B-34. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing - desizing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (21.4 KKg/day)		Medium (53.6 KKg/day)		Large (178.5 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	32,712.0	100.0	71,986.8	100.0	218,156.4	100.0
COSTS:						
Textile Materials	14,066.2	43.0	49,526.9	68.8	118,677.1	54.4
Direct Labor	6,378.8	19.5	11,877.8	16.5	30,323.7	13.9
Indirect Labor	1,308.5	4.0	2,951.5	4.1	12,216.8	5.6
Other	8,570.5	26.2	2,519.5	3.5	41,013.4	18.8
TOTAL	30,324.0	92.7	66,875.7	92.9	202,231.0	92.7
CASH EARNINGS	2,388.0	7.3	5,111.1	7.1	15,925.4	7.3
LESS:						
Depreciation	883.2	2.7	1,511.7	2.1	4,581.3	2.1
Interest	327.1	1.0	0.0	0.0	436.3	0.2
PRE-TAX INCOME	1,177.7	3.6	3,599.4	5.0	10,907.8	5.0
INCOME TAX	522.5	1.6	1,636.5	2.3	4,998.3	2.3
AFTER-TAX INCOME	655.2	2.0	1,962.9	2.7	5,909.5	2.7
CASH FLOW	1,538.4	4.7	3,474.6	4.8	10,490.8	4.8

Appendix Table B-35. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing - simple processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect

	Small (1.6 KKg/day)		Medium (19.3 KKg/day)		Large (32.2 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	1,008.0	100.0	6,528.0	100.0	10,852.8	100.0
COSTS:						
Textile Materials	0.0	0.0	0.0	0.0	0.0	0.0
Direct Labor	304.4	30.2	1,259.9	19.3	2,094.6	19.3
Indirect Labor	136.1	13.5	1,403.5	21.5	2,333.4	21.5
Other	492.9	48.9	3,224.8	49.4	5,361.3	49.4
TOTAL	933.4	92.6	5,888.2	90.2	9,789.3	90.2
CASH EARNINGS	74.6	7.4	639.8	9.8	1,063.5	9.8
LESS:						
Depreciation	40.3	4.0	306.8	4.7	510.1	4.7
Interest	11.1	1.1	78.3	1.2	130.2	1.2
PRE-TAX INCOME	23.2	2.3	254.7	3.9	423.2	3.9
INCOME TAX	3.9	0.4	97.9	1.5	175.4	1.6
AFTER-TAX INCOME	19.3	1.9	156.8	2.4	247.9	2.3
CASH FLOW	59.6	5.9	463.6	7.1	758.0	7.0

Appendix Table B-36. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing - simple processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (1.6 KKg/day)		Medium (19.3 KKg/day)		Large (32.2 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	2,721.6	100.0	41,580.0	100.0	62,151.6	100.0
COSTS:						
Textile Materials	1,366.2	50.2	23,866.9	57.4	17,651.1	28.4
Direct Labor	351.1	12.9	2,993.8	7.2	5,655.8	9.1
Indirect Labor	157.9	5.8	2,578.0	6.2	435.1	0.7
Other	723.9	26.6	9,771.3	23.5	34,121.2	54.9
TOTAL	2,599.1	95.5	39,210.0	94.3	57,863.2	93.1
CASH EARNINGS	122.5	4.5	2,370.0	5.7	4,288.4	6.9
LESS:						
Depreciation	40.8	1.5	873.2	2.1	1,305.2	2.1
Interest	13.6	0.5	291.1	0.7	62.2	0.1
PRE-TAX INCOME	68.1	2.5	1,205.7	2.9	2,921.0	4.7
INCOME TAX	14.7	0.5	535.4	1.3	1,324.4	2.1
AFTER-TAX INCOME	53.4	2.0	670.3	1.6	1,596.6	2.6
CASH FLOW	94.2	3.5	1,543.5	3.7	2,901.8	4.7

Appendix Table B-37. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing - complex processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect

	Small (7.7 KKg/day)		Medium (18.5 KKg/day)		Large (46.3 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	4,608.0	100.0	6,201.6	100.0	16,646.4	100.0
COSTS:						
Textile Materials	0.0	0.0	0.0	0.0	0.0	0.0
Direct Labor	1,824.8	39.6	1,196.9	19.3	3,212.8	19.3
Indirect Labor	202.8	4.4	1,333.3	21.5	3,579.0	21.5
Other	2,248.6	48.8	3,063.6	49.4	8,223.3	49.4
TOTAL	4,276.2	92.8	5,593.8	90.2	15,015.1	90.2
CASH EARNINGS	331.8	7.2	607.8	9.8	1,631.3	9.8
LESS:						
Depreciation	184.3	4.0	291.5	4.7	782.4	4.7
Interest	21.8	0.5	74.4	1.2	199.8	1.2
PRE-TAX INCOME	125.7	2.7	241.9	3.9	649.1	3.9
INCOME TAX	38.6	0.8	92.0	1.5	279.3	1.7
AFTER-TAX INCOME	87.1	1.9	149.9	2.4	369.8	2.2
CASH FLOW	271.4	5.9	441.4	7.2	1,152.2	6.9

Appendix Table B-38. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing - Complex processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (7.7 KKg/day)		Medium (18.5 KKg/day)		Large (46.3 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	14,630.4	100.0	40,194.0	100.0	99,733.2	100.0
COSTS:						
Textile Materials	8,895.3	60.8	23,071.4	57.4	28,324.2	28.4
Direct Labor	1,448.4	9.9	2,894.0	7.2	9,075.7	9.1
Indirect Labor	1,902.0	13.0	2,492.0	6.2	698.1	0.7
Other	1,448.4	9.9	9,445.6	23.5	54,753.5	54.9
TOTAL	13,694.1	93.6	37,903.0	94.3	92,851.5	93.1
CASH EARNINGS	936.3	6.4	2,291.0	5.7	6,881.7	6.9
LESS:						
Depreciation	292.6	2.0	844.1	2.1	2,094.4	2.1
Interest	117.0	0.8	281.4	0.7	99.7	0.1
PRE-TAX INCOME	526.7	3.6	1,165.5	2.9	4,687.6	4.7
INCOME TAX	223.0	1.5	516.9	1.3	2,137.0	2.1
AFTER-TAX INCOME	303.7	2.1	648.6	1.6	2,550.6	2.6
CASH FLOW	596.3	4.1	1,492.7	3.7	4,645.0	4.7

Appendix Table B-39. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing - hosiery TYPE OF PLANT: Own hosiery TYPE OF DISCHARGER: Indirect

	Small (2.5 KKg/day)		Medium (5.5 KKg/day)		Large (12.6 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	5,187.6	100.0	15,379.2	100.0	38,448.0	100.0
COSTS:						
Textile Materials	2,619.7	50.5	7,766.5	50.5	19,416.2	50.5
Direct Labor	1,011.6	19.5	1,491.8	9.7	3,729.5	9.7
Indirect Labor	129.7	2.5	353.7	2.3	884.3	2.3
Other	1,260.6	24.3	5,105.9	33.2	12,764.7	33.2
TOTAL	5,021.6	96.8	14,717.9	95.7	36,794.7	95.7
CASH EARNINGS	166.0	3.2	661.3	4.3	1,653.3	4.3
LESS:						
Depreciation	77.8	1.5	138.4	0.9	346.0	0.9
Interest	25.9	0.5	0.0	0.0	0.0	0.0
PRE-TAX INCOME	62.3	1.2	522.9	3.4	1,307.3	3.4
INCOME TAX	12.9	0.2	221.3	1.4	582.1	1.5
AFTER-TAX INCOME	49.4	1.0	301.6	2.0	725.2	1.9
CASH FLOW	127.2	2.5	440.0	2.9	1,071.2	2.8

Appendix Table B-40. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing - hosiery TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (2.5 KKg/day)		Medium (5.5 KKg/day)		Large (12.6 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	9,619.2	100.0	12,312.0	100.0	28,728.0	100.0
COSTS:						
Textile Materials	3,107.0	32.3	5,503.5	44.7	12,841.4	44.7
Direct Labor	2,145.1	22.3	2,942.6	23.9	6,866.0	23.9
Indirect Labor	596.4	6.2	689.5	5.6	1,608.8	5.6
Other	3,337.9	34.7	2,339.3	19.0	5,458.3	19.0
TOTAL	9,186.4	95.5	11,474.9	93.2	26,774.5	93.2
CASH EARNINGS	432.8	4.5	837.1	6.8	1,953.5	6.8
LESS:						
Depreciation	144.3	1.5	184.7	1.5	430.9	1.5
Interest	0.0	0.0	36.9	0.3	86.2	0.3
PRE-TAX INCOME	288.5	3.0	615.5	5.0	1,436.4	5.0
INCOME TAX	113.5	1.2	263.9	2.1	641.5	2.2
AFTER-TAX INCOME	175.0	1.8	351.6	2.9	794.9	2.8
CASH FLOW	319.3	3.3	536.3	4.4	1,225.8	4.3

Appendix Table B-41. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Carpet finishing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (8.9 KKg/day)		Medium (48.6 KKg/day		Large (121.5 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	9,430.8	100.0	32,803.2	100.0	56,601.6	100.0
COSTS:						
Textile Materials	4,526.8	48.0	20,600.4	62.8	30,281.9	53.5
Direct Labor	933.6	9.9	1,180.4	3.6	4,528.1	8.0
Indirect Labor	481.0	5.1	1,312.1	4.0	1,018.8	1.8
Other	2,923.5	31.0	8,135.2	24.8	17,716.3	31.3
TOTAL	8,864.9	94.0	31,228.1	95.2	53,545.1	94.6
CASH EARNINGS	565.9	6.0	1,575.1	4.8	3,056.5	5.4
LESS:						
Depreciation	150.9	1.6	393.6	1.2	735.8	1.3
Interest	75.4	0.8	459.2	1.4	622.6	1.1
PRE-TAX INCOME	339.6	3.6	722.3	2.2	1,698.1	3.0
INCOME TAX	137.0	1.5	313.0	1.0	761.9	1.3
AFTER-TAX INCOME	202.6	2.1	409.3	1.2	936.2	1.7
CASH FLOW	353.5	3.7	802.9	2.4	1,672.0	3.0

Appendix Table B-42. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect

	Small (4.3 KKg/day)		Medium (9.8 KKg/day)		Large (23.5 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	799.2	100.0	1,864.8	100.0	3,690.0	100.0
COSTS:						
Textile Materials	0.0	0.0	0.0	0.0	0.0	0.0
Direct Labor	273.3	34.2	432.6	23.2	642.1	17.4
Indirect Labor	160.6	20.1	270.4	14.5	350.6	9.5
Other	328.5	41.1	999.5	53.6	2,361.6	64.0
TOTAL	762.4	95.4	1,702.5	91.3	3,354.3	90.9
CASH EARNINGS	36.8	4.6	162.3	8.7	335.7	9.1
LESS:						
Depreciation	13.6	1.7	98.8	5.3	180.8	4.9
Interest	5.6	0.7	52.2	2.8	73.8	2.0
PRE-TAX INCOME	17.6	2.2	11.3	0.6	81.1	2.2
INCOME TAX	3.0	0.4	1.9	0.1	19.2	0.5
AFTER-TAX INCOME	14.6	1.8	9.4	0.5	61.9	1.7
CASH FLOW	28.2	3.5	108.2	5.8	242.7	6.6

Appendix Table B-43. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing TYPE OF PLANT: Own yarn TYPE OF DISCHARGER: Indirect

	Small (4.3 kkg/day)		Medium (9.8 kkg/day)		Large (23.5 kkg/day)		X-Large (58.6 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	3,990.0	100.0	8,410.8	100.0	16,438.8	100.0	40,714.8	100.0
COSTS:								
Textile Materials	2,557.6	64.1	5,391.3	64.1	8,811.2	53.6	18,321.7	45.0
Direct Labor	498.8	12.5	1,051.4	12.5	1,528.8	9.3	3,542.2	8.7
Indirect Labor	87.8	2.2	185.0	2.2	230.1	1.4	5,740.8	14.1
Other	634.4	15.9	1,429.8	17.0	4,865.9	29.6	9,201.5	22.6
TOTAL	3,778.6	94.7	8,057.5	95.8	15,436.0	93.9	36,806.2	90.4
CASH EARNINGS	211.4	5.3	353.3	4.2	1,002.8	6.1	3,908.6	9.6
LESS								
Depreciation	59.9	1.5	109.3	1.3	361.7	2.2	1,506.4	3.7
Interest	27.9	0.7	58.9	0.7	98.6	0.6	1,302.9	3.2
PRE-TAX INCOME	123.6	3.1	185.1	2.2	542.5	3.3	1,099.3	2.7
INCOME TAX	37.6	0.9	65.9	0.8	230.3	1.4	486.4	1.2
AFTER-TAX INCOME	86.0	2.2	119.2	1.4	312.2	1.9	612.9	1.5
CASH FLOW	145.9	3.7	228.5	2.7	673.9	4.1	2,119.3	5.2

Appendix Table B-44. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Stock and yarn finishing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect

	Small (4.3 kkg/day)		Medium (9.8 kkg/day)		Large (23.5 kkg/day)		X-Large (58.6 kkg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	3,168.0	100.0	7,286.4	100.0	17,424.0	100.0	41,025.6	100.0
COSTS:								
Textile Materials	1,349.6	42.6	3,104.0	42.6	9,530.9	54.7	22,441.0	54.7
Direct Labor	548.1	17.3	1,260.5	17.3	3,380.3	19.4	7,959.0	19.4
Indirect Labor	120.4	3.8	276.9	3.8	540.1	3.1	1,271.8	3.1
Other	985.2	31.1	2,266.1	31.1	3,066.7	17.6	7,220.4	17.6
TOTAL	3,003.3	94.8	6,907.5	94.8	16,518.0	94.8	38,892.2	94.8
CASH EARNINGS	164.7	5.2	378.9	5.2	906.0	5.2	2,133.4	5.2
LESS								
Depreciation	88.7	2.8	204.0	2.8	69.7	0.4	164.2	0.4
Interest	15.8	0.5	36.4	0.5	278.8	1.6	656.4	1.6
PRE-TAX INCOME	60.2	1.9	138.5	1.9	557.5	3.2	1,312.8	3.2
INCOME TAX	12.3	0.4	44.5	0.6	237.2	1.4	534.6	1.4
AFTER-TAX INCOME	47.9	1.5	94.0	1.3	320.3	1.8	728.2	1.8
CASH FLOW	136.6	4.3	298.0	4.1	390.0	2.2	892.4	2.2

Appendix Table B-45. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Nonwoven manufacturing TYPE OF PLANT: N.A. TYPE OF DISCHARGER: Indirect

	Small (10.4 KKg/day)		Medium (23.6 KKg/day)		Large (56.7 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	10,267.2	100.0	24,552.0	100.0	55,800.0	100.0
COSTS:						
Textile Materials	3,706.5	36.1	7,218.3	29.4	13,113.0	23.5
Direct Labor	1,026.7	10.0	1,595.9	6.5	6,975.0	12.5
Indirect Labor	246.4	2.4	982.1	4.0	2,901.6	5.2
Other	4,589.4	44.7	13,086.1	53.3	28,569.6	51.2
TOTAL	9,569.0	93.2	22,882.4	93.2	51,559.2	92.4
CASH EARNINGS	698.2	6.8	1,669.6	6.8	4,240.8	7.6
LESS:						
Depreciation	256.7	2.5	736.6	3.0	1,729.8	3.1
Interest	143.8	1.4	238.9	1.0	0.0	0.0
PRE-TAX INCOME	297.7	2.9	694.1	2.8	2,511.0	4.5
INCOME TAX	117.7	1.1	300.0	1.2	1,135.8	2.0
AFTER-TAX INCOME	180.0	1.8	394.1	1.6	1,375.2	2.5
CASH FLOW	436.7	4.3	1,130.7	4.6	3,105.0	5.6

Appendix Table B-46. The textile industry, representative existing model plants' cost characteristics

SUBCATEGORY: Felted fabric processing TYPE OF PLANT: N.A. TYPE OF DISCHARGER: Indirect

	Small (0.9 KKg/day)		Medium (4.4 KKg/day)		Large (10.7 KKg/day)	
	($000)	(Percent)	($000)	(Percent)	($000)	(Percent)
SALES	4,123.2	100.0	9,273.6	100.0	2,040.0	100.0
COSTS:						
Textile Materials	1,204.0	29.2	2,745.0	29.6	501.8	24.6
Direct Labor	808.1	19.6	1,474.5	15.9	295.8	14.5
Indirect Labor	441.2	10.7	1,112.8	12.0	112.2	5.5
Other	1,150.4	27.9	3,477.6	37.5	1,073.0	52.6
TOTAL	3,603.7	87.4	8,809.9	95.0	1,982.8	97.2
CASH EARNINGS	519.5	12.6	463.7	5.0	57.2	2.8
LESS:						
Depreciation	115.4	2.8	194.8	2.1	24.5	1.2
Interest	74.2	1.8	0.0	0.0	10.2	0.5
PRE-TAX INCOME	329.9	8.0	268.9	2.9	22.5	1.1
INCOME TAX	132.5	3.2	104.4	1.1	3.8	0.2
AFTER-TAX INCOME	197.4	4.8	164.5	1.8	18.7	0.9
CASH FLOW	312.8	7.6	359.3	3.9	43.2	2.1

Appendix Table B-47. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Wool finishing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct (NSPS)

	Medium (18.6 kkg/day)	
	($000)	(Percent)
SALES	33,686.4	100.0
COSTS:		
Textile Materials	12,362.9	36.7
Direct Labor	2,998.1	8.9
Indirect Labor	3,233.9	9.6
Other	9,196.4	27.3
TOTAL	27,791.3	82.5
CASH EARNINGS	5,895.1	17.5
LESS:		
Depreciation	1,078.0	3.2
Interest	471.6	1.4
PRE-TAX INCOME	4,345.5	12.9
INCOME TAX	1,979.7	5.9
AFTER-TAX INCOME	2,365.8	7.0
CASH FLOW	3,443.8	10.2

Appendix Table B-48. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct (NSPS)

	Medium (29.6 kkg/day)	
	($000)	(Percent)
SALES	8,784.0	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	1,756.8	20.0
Indirect Labor	702.7	8.0
Other	4,558.9	51.9
TOTAL	7,018.4	79.9
CASH EARNINGS	1,765.6	20.1
LESS:		
Depreciation	483.1	5.5
Interest	175.7	2.0
PRE-TAX INCOME	1,106.8	12.6
INCOME TAX	489.9	5.6
AFTER-TAX INCOME	616.9	7.0
CASH FLOW	1,100.0	12.5

Appendix Table B-49. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Direct (NSPS)

	Medium (29.6 kkg/day)	
	($000)	(Percent)
SALES	29,023.2	100.0
COSTS:		
Textile Materials	17,413.9	60.0
Direct Labor	2,713.7	9.4
Indirect Labor	3,083.6	10.6
Other	1,874.9	6.5
TOTAL	25,086.1	86.1
CASH EARNINGS	3,937.1	13.6
LESS:		
Depreciation	1,160.9	4.0
Interest	428.5	1.5
PRE-TAX INCOME	2,347.7	8.1
INCOME TAX	1,060.7	3.7
AFTER-TAX INCOME	1,287.0	4.4
CASH FLOW	2,447.9	8.4

Appendix Table B-50. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct (NSPS)

	Medium (29.6 kkg/day)	
	($000)	(Percent)
SALES	45,240.0	100.0
COSTS:		
Textile Materials	22,620.0	50.0
Direct Labor	7,057.4	15.6
Indirect Labor	1,447.7	3.2
Other	4,994.5	11.0
TOTAL	36,119.6	79.8
CASH EARNINGS	9,120.4	20.2
LESS:		
Depreciation	2,262.0	5.0
Interest	845.5	1.9
PRE-TAX INCOME	6,012.9	13.3
INCOME TAX	2,746.7	6.1
AFTER-TAX INCOME	3,266.2	7.2
CASH FLOW	5,528.2	12.2

Appendix Table B-51. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct (NSPS)

	Medium (116.3 kkg/day)	
	($000)	(Percent)
SALES	39,240.0	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	7,838.2	20.0
Indirect Labor	3,135.2	8.0
Other	20,379.2	51.9
TOTAL	31,352.6	79.9
CASH EARNINGS	7,887.4	20.1
LESS:		
Depreciation	1,962.0	5.0
Interest	745.8	1.9
PRE-TAX INCOME	5,179.6	13.2
INCOME TAX	2,363.4	6.0
AFTER-TAX INCOME	2,816.2	7.2
CASH FLOW	4,778.2	12.2

Appendix Table B-52. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Direct (NSPS)

	Medium (116.3 kkg/day)	
	($000)	(Percent)
SALES	117,720.0	100.0
COSTS:		
Textile Materials	70,632.0	60.0
Direct Labor	11,006.9	9.4
Indirect Labor	12,507.7	10.6
Other	6,804.2	5.8
TOTAL	100,950.8	85.8
CASH EARNINGS	16,769.2	14.2
LESS:	5,101.2	4.3
Depreciation	2,002.4	1.7
Interest	9,665.6	8.2
PRE-TAX INCOME	4,426.9	3.8
INCOME TAX	5,238.7	4.5
AFTER-TAX INCOME	10,339.9	8.8
CASH FLOW		

Appendix Table B-53. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct (NSPS)

	Medium (116.3 kkg/day)	
	($000)	(Percent)
SALES	139,708.8	100.0
COSTS:		
Textile Materials	62,869.0	45.0
Direct Labor	15,813.0	11.3
Indirect Labor	6,370.8	4.6
Other	26,612.4	19.0
TOTAL	111,665.2	79.9
CASH EARNINGS	28,043.6	20.1
LESS:		
Depreciation	7,451.2	5.3
Interest	2,757.8	2.0
PRE-TAX INCOME	17,834.6	12.8
INCOME TAX	8,184.7	5.9
AFTER-TAX INCOME	9,649.9	6.9
CASH FLOW	17,101.1	12.2

Appendix Table B-54. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct (NSPS)

	Medium (53.6 kkg/day)	
	($000)	(Percent)
SALES	21,216.0	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	4,328.0	20.4
Indirect Labor	2,723.0	12.8
Other	8,926.7	42.1
TOTAL	15,977.8	75.3
CASH EARNINGS	5,238.2	24.7
LESS:		
Depreciation	1,060.8	5.0
Interest	356.4	1.7
PRE-TAX INCOME	3,821.0	18.0
INCOME TAX	1,738.4	8.2
AFTER-TAX INCOME	2,082.6	9.8
CASH FLOW	3,143.4	14.8

Appendix Table B-55. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Direct (NSPS)

	Medium (53.6 kkg/day)	
	($000)	(Percent)
SALES	52,107.6	100.0
COSTS:		
Textile Materials	31,264.6	60.0
Direct Labor	4,872.0	9.3
Indirect Labor	5,536.4	10.6
Other	2,659.5	5.1
TOTAL	44,330.5	85.1
CASH EARNINGS	7,777.1	14.9
LESS:		
Depreciation	2,431.7	4.7
Interest	995.8	1.9
PRE-TAX INCOME	4,349.6	8.3
INCOME TAX	1,981.6	3.8
AFTER-TAX INCOME	2,368.0	4.5
CASH FLOW	4,799.7	9.2

Appendix Table B-56. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing   TYPE OF PLANT: Integrated   TYPE OF DISCHARGER: Direct (NSPS)

	Medium (53.6 kkg/day)	
	($000)	(Percent)
SALES	71,986.8	100.0
COSTS:		
Textile Materials	28,794.7	40.0
Direct Labor	3,685.7	5.1
Indirect Labor	691.1	1.0
Other	23,784.4	33.0
TOTAL	56,955.9	79.1
CASH EARNINGS	15,030.9	20.9
LESS:		
Depreciation	4,079.3	5.7
Interest	1,496.6	2.1
PRE-TAX INCOME	9,455.0	13.1
INCOME TAX	4,330.0	6.0
AFTER-TAX INCOME	5,125.0	7.1
CASH FLOW	9,204.3	12.8

Appendix Table B-57. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-simple processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct (NSPS)

	Medium (32.2 kkg/day)	
	($000)	(Percent)
SALES	10,852.8	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	1,780.4	16.4
Indirect Labor	1,983.4	18.3
Other	4,271.0	39.3
TOTAL	8,034.8	74.0
CASH EARNINGS	2,818.0	26.0
LESS:		
Depreciation	651.1	6.0
Interest	218.4	2.0
PRE-TAX INCOME	1,948.5	18.0
INCOME TAX	877.1	8.1
AFTER-TAX INCOME	1,071.4	9.9
CASH FLOW	1,722.5	15.9

Appendix Table B-58. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-simple processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct (NSPS)

	Medium (32.2 kkg/day)	
	($000)	(Percent)
SALES	68,940.0	100.0
COSTS:		
Textile Materials	34,470.0	50.0
Direct Labor	5,332.6	7.7
Indirect Labor	410.2	0.7
Other	18,165.6	26.3
TOTAL	58,378.4	84.7
CASH EARNINGS	10,561.7	15.3
LESS:		
Depreciation	1,838.4	2.7
Interest	564.6	0.8
PRE-TAX INCOME	8,158.7	11.8
INCOME TAX	3,733.7	5.4
AFTER-TAX INCOME	4,424.9	6.4
CASH FLOW	6,263.3	9.1

Appendix Table B-59. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-complex processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct (NSPS)

	Medium (18.5 kkg/day)	
	($000)	(Percent)
SALES	7,099.2	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	1,164.6	16.4
Indirect Labor	1,297.3	18.3
Other	2,793.8	39.4
TOTAL	5,061.7	71.3
CASH EARNINGS	2,037.5	28.7
LESS:		
Depreciation	473.3	6.7
Interest	171.7	2.4
PRE-TAX INCOME	1,392.5	19.6
INCOME TAX	621.3	8.8
AFTER-TAX INCOME	771.2	10.8
CASH FLOW	1,244.5	17.5

Appendix Table B-60. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-complex processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct (NSPS)

	Medium (18.5 kkg/day)	
	($000)	(Percent)
SALES	40,194.0	100.0
COSTS:		
Textile Materials	20,097.0	50.0
Direct Labor	2,579.9	6.3
Indirect Labor	2,118.2	5.2
Other	9,156.1	22.8
TOTAL	33,831.2	84.2
CASH EARNINGS	6,362.8	15.8
LESS:		
Depreciation	1,339.8	3.3
Interest	542.8	1.4
PRE-TAX INCOME	4,480.2	11.2
INCOME TAX	2,041.7	5.1
AFTER-TAX INCOME	2,438.5	6.1
CASH FLOW	3,778.3	9.4

Appendix Table B-61. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-hosiery products TYPE OF PLANT: Own hosiery products TYPE OF DISCHARGER: Direct (NSPS)

	Medium (5.5 kkg/day)	
	($000)	(Percent)
SALES	15,379.2	100.0
COSTS:		
Textile Materials	7,689.6	50.0
Direct Labor	1,268.1	8.3
Indirect Labor	389.0	2.5
Other	3,804.1	24.7
TOTAL	13,150.8	85.5
CASH EARNINGS	2,228.4	14.5
LESS:		
Depreciation	205.1	1.3
Interest	109.8	0.7
PRE-TAX INCOME	1,913.5	12.4
INCOME TAX	860.9	5.6
AFTER-TAX INCOME	1,052.6	6.8
CASH FLOW	1,257.7	8.2

Appendix Table B-62. The textile industry', representative new source model plants' cost characteristics

SUBCATEGORY: Carpet finishing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Direct (NSPS)

	Small (20.2 kkg/day)	
	($000)	(Percent)
SALES	47,998.8	100.0
COSTS:		
Textile Materials	23,999.4	50.0
Direct Labor	1,550.4	3.2
Indirect Labor	979.1	2.1
Other	14,402.0	30.0
TOTAL	40,930.9	85.3
CASH EARNINGS	7,067.8	14.7
LESS:		
Depreciation	1,279.9	2.7
Interest	433.4	0.9
PRE-TAX INCOME	4,354.5	11.2
INCOME TAX	2,443.8	5.1
AFTER-TAX INCOME	2,910.7	6.1
CASH FLOW	4,190.6	8.7

Appendix Table B-63. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Direct (NSPS)

	Medium (23.4 kkg/day)	
	($000)	(Percent)
SALES	1,864.8	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	367.7	19.7
Indirect Labor	229.9	12.3
Other	748.1	40.1
TOTAL	1,345.7	72.2
CASH EARNINGS	519.1	27.8
LESS:		
Depreciation	248.6	13.3
Interest	80.0	4.3
PRE-TAX INCOME	190.5	10.2
INCOME TAX	68.4	3.7
AFTER-TAX INCOME	122.1	6.5
CASH FLOW	370.7	19.9

Appendix Table B-64. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing TYPE OF PLANT: Own yarn TYPE OF DISCHARGER: Direct (NSPS)

	Medium (23.5 kkg/day)	
	($000)	(Percent)
SALES	16,438.8	100.0
COSTS:		
Textile Materials	8,219.4	50.0
Direct Labor	1,299.5	7.9
Indirect Labor	195.6	1.2
Other	4,122.0	25.1
TOTAL	13,836.5	84.2
CASH EARNINGS	2,602.3	15.8
LESS:		
Depreciation	602.8	3.7
Interest	214.1	1.3
PRE-TAX INCOME	1,785.4	10.9
INCOME TAX	802.0	4.9
AFTER-TAX INCOME	983.4	6.0
CASH FLOW	1,586.2	9.6

Appendix Table B-65. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Nonwoven manufacturing TYPE OF PLANT: Not applicable TYPE OF DISCHARGER: Direct (NSPS)

	Medium (23.6 kkg/day)	
	($000)	(Percent)
SALES	23,760.0	100.0
COSTS:		
Textile Materials	5,940.0	25.0
Direct Labor	2,060.0	8.7
Indirect Labor	1,030.0	4.3
Other	10,037.4	42.2
TOTAL	19,067.4	80.3
CASH EARNINGS	4,692.6	19.8
LESS:		
Depreciation	1,425.6	6.0
Interest	474.0	2.0
PRE-TAX INCOME	2,793.0	11.8
INCOME TAX	1,265.5	5.3
AFTER-TAX INCOME	1,527.5	6.4
CASH FLOW	2,953.1	12.4

Appendix Table B-66. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Wool finishing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (18.6 kkg/day)	
	($000)	(Percent)
SALES	50,160.0	100.0
COSTS:		
Textile Materials	19,060.8	38.0
Direct Labor	4,476.8	8.9
Indirect Labor	4,817.9	9.6
Other	11,597.0	23.1
TOTAL	39,952.5	79.7
CASH EARNINGS	10,207.5	20.3
LESS:		
Depreciation	1,605.1	3.2
Interest	958.6	1.9
PRE-TAX INCOME	7,643.8	15.2
INCOME TAX	3,496.9	7.0
AFTER-TAX INCOME	4,146.9	8.3
CASH FLOW	5,752.0	11.5

Appendix Table B-67. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (12.3 kkg/day)	
	($000)	(Percent)
SALES	3,369.6	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	776.3	23.0
Indirect Labor	166.1	4.9
Other	1,601.0	47.5
TOTAL	2,543.4	75.5
CASH EARNINGS	826.2	24.5
LESS:		
Depreciation	168.5	5.0
Interest	60.5	1.8
PRE-TAX INCOME	597.2	17.7
INCOME TAX	255.5	7.6
AFTER-TAX INCOME	341.7	10.1
CASH FLOW	510.2	15.1

Appendix Table B-68. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing
TYPE OF PLANT: Own fabric
TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (12.3 kkg/day)	
	($000)	(Percent)
SALES	11,210.4	100.0
COSTS:		
Textile Materials	6,726.2	60.0
Direct Labor	676.6	6.0
Indirect Labor	590.8	5.3
Other	1,515.0	13.5
TOTAL	9,508.6	84.8
CASH EARNINGS	1,701.8	15.2
LESS:		
Depreciation	448.4	4.0
Interest	166.0	1.5
PRE-TAX INCOME	1,087.4	9.7
INCOME TAX	481.0	4.3
AFTER-TAX INCOME	606.4	5.4
CASH FLOW	1,054.8	9.4

Appendix Table B-69. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-simple processing
TYPE OF PLANT: Integrated
TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (12.3 kkg/day)	
	($000)	(Percent)
SALES	23,133.6	
COSTS:		
Textile Materials	11,566.8	50.0
Direct Labor	1,554.6	6.7
Indirect Labor	703.2	3.0
Other	4,719.2	20.4
TOTAL	18,543.8	80.2
CASH EARNINGS	4,589.8	19.8
LESS:		
Depreciation	1,156.7	5.0
Interest	532.4	1.9
PRE-TAX INCOME	3,000.7	13.0
INCOME TAX	1,361.1	5.9
AFTER-TAX INCOME	1,639.6	7.1
CASH FLOW	2,796.3	12.1

Appendix Table B-70. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (23.3 kkg/day)	
	($000)	(Percent)
SALES	5,990.4	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	1,196.5	20.0
Indirect Labor	478.7	8.0
Other	2,851.4	47.6
TOTAL	4,526.6	75.6
CASH EARNINGS	1,463.8	24.4
LESS:		
Depreciation	259.6	4.3
Interest	98.2	1.6
PRE-TAX INCOME	1,106.0	18.5
INCOME TAX	462.8	7.7
AFTER-TAX INCOME	643.2	10.7
CASH FLOW	902.8	15.1

Appendix Table B-71. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Indirect (NSPS)

	Medium (23.3 kkg/day)	
	($000)	(Percent)
SALES	22,759.2	100.0
COSTS:		
Textile Materials	13,655.5	60.0
Direct Labor	1,373.5	6.0
Indirect Labor	1,198.6	5.3
Other	3,443.5	15.1
TOTAL	19,671.1	86.4
CASH EARNINGS	3,088.1	13.6
LESS:		
Depreciation	986.3	4.3
Interest	359.9	1.6
PRE-TAX INCOME	1,741.9	7.7
INCOME TAX	782.0	3.4
AFTER-TAX INCOME	959.9	4.2
CASH FLOW	1,946.2	8.6

Appendix Table B-72. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-complex processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (23.3 kkg/day)	
	($000)	(Percent)
SALES	37,932.0	100.0
COSTS:		
Textile Materials	17,069.4	45.0
Direct Labor	5,917.4	15.6
Indirect Labor	1,213.8	3.2
Other	5,704.9	15.0
TOTAL	29,905.5	78.8
CASH EARNINGS	8,026.5	21.2
LESS:		
Depreciation	2,023.1	5.3
Interest	748.8	2.0
PRE-TAX INCOME	5,254.6	13.9
INCOME TAX	2,397.9	6.3
AFTER-TAX INCOME	2,856.7	7.5
CASH FLOW	4,879.8	12.9

Appendix Table B-73. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (53.6 kkg/day)	
	($000)	(Percent)
SALES	21,216.0	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	4,328.0	20.4
Indirect Labor	2,723.0	12.8
Other	8,367.6	39.4
TOTAL	15,418.6	72.7
CASH EARNINGS	5,797.4	27.3
LESS:		
Depreciation	1,060.8	5.0
Interest	356.4	1.7
PRE-TAX INCOME	4,380.2	20.6
INCOME TAX	1,995.6	9.4
AFTER-TAX INCOME	2,384.6	11.2
CASH FLOW	3,445.4	16.2

Appendix Table B-74. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing TYPE OF PLANT: Own fabric TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (53.6 kkg/day)	
	($000)	(Percent)
SALES	52,107.6	100.0
COSTS:		
Textile Materials	31,264.6	60.0
Direct Labor	4,872.0	9.3
Indirect Labor	5,352.8	10.3
Other	2,841.1	5.5
TOTAL	44,330.5	85.1
CASH EARNINGS	7,777.1	14.9
LESS:		
Depreciation	2,431.7	4.7
Interest	878.6	1.7
PRE-TAX INCOME	4,466.8	8.6
INCOME TAX	2,035.5	3.9
AFTER-TAX INCOME	2,431.3	4.7
CASH FLOW	4,863.0	9.3

Appendix Table B-75. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Woven fabric finishing-desizing
TYPE OF PLANT: Integrated
TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (53.6 kkg/day)	
	($000)	(Percent)
SALES	71,986.8	100.0
COSTS:		
Textile Materials	28,794.7	40.0
Direct Labor	3,685.7	5.1
Indirect Labor	691.1	1.0
Other	23,784.4	33.0
TOTAL	56,955.9	79.1
CASH EARNINGS	15,030.9	20.9
LESS:		
Depreciation	4,079.3	5.7
Interest	1,496.6	2.1
PRE-TAX INCOME	9,455.0	13.1
INCOME TAX	4,330.1	6.0
AFTER-TAX INCOME	5,124.9	7.1
CASH FLOW	9,204.2	12.8

Appendix Table B-76. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-simple processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (19.3 kkg/day)	
	($000)	(Percent)
SALES	6,528.0	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	1,070.9	16.4
Indirect Labor	1,193.0	18.3
Other	2,569.1	39.4
TOTAL	4,833.0	74.0
CASH EARNINGS	1,695.0	26.0
LESS:		
Depreciation	391.7	6.0
Interest	148.8	2.3
PRE-TAX INCOME	1,154.5	17.7
INCOME TAX	511.8	7.8
AFTER-TAX INCOME	642.7	9.8
CASH FLOW	1,034.4	15.8

Appendix Table B-77. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-simple processing TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (19.3 kkg/day)	
	($000)	(Percent)
SALES	41.580.0	100.0
COSTS:		
Textile Materials	20,790.0	50.0
Direct Labor	2,544.7	6.1
Indirect Labor	2,191.3	5.3
Other	9,471.8	22.8
TOTAL	34,997.8	84.2
CASH EARNINGS	6,582.2	15.8
LESS:		
Depreciation	1,108.8	2.7
Interest	467.2	1.1
PRE-TAX INCOME	5,006.2	12.0
INCOME TAX	2,283.6	5.5
AFTER-TAX INCOME	2,722.6	6.5
CASH FLOW	3,831.4	9.2

Appendix Table B-78. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-complex processing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (18.5 kkg/day)	
	($000)	(Percent)
SALES	6,201.6	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	1,017.4	16.4
Indirect Labor	1,133.3	18.3
Other	2,440.7	39.4
TOTAL	4,591.4	74.0
CASH EARNINGS	1,610.2	26.0
LESS:		
Depreciation	413.4	6.7
Interest	138.0	2.2
PRE-TAX INCOME	1,058.8	17.1
INCOME TAX	467.8	7.5
AFTER-TAX INCOME	591.0	9.5
CASH FLOW	1,004.4	16.2

Appendix Table B-79. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric TYPE OF PLANT: Integrated finishing-complex processing TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (18.5 kkg/day)	
	($000)	(Percent)
SALES	40,194.0	100.0
COSTS:		
Textile Materials	20,097.0	50.0
Direct Labor	2,459.9	6.1
Indirect Labor	2,118.2	5.3
Other	9,156.1	22.8
TOTAL	33,831.2	84.2
CASH EARNINGS	6,362.8	15.8
LESS:		
Depreciation	1,339.8	3.3
Interest	666.8	1.7
PRE-TAX INCOME	4,356.2	10.8
INCOME TAX	1,984.6	4.9
AFTER-TAX INCOME	2,371.6	5.9
CASH FLOW	3,711.4	9.2

Appendix Table B-80. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-hosiery products TYPE OF PLANT: Own hosiery products TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (12.6 kkg/day)	
	($000)	(Percent)
SALES	38,448.0	100.0
COSTS:		
Textile Materials	19,224.0	50.0
Direct Labor	3,170.0	8.2
Indirect Labor	751.7	2.0
Other	9,510.1	24.7
TOTAL	32,655.8	84.9
CASH EARNINGS	5,792.2	15.1
LESS:		
Depreciation	512.6	1.3
Interest	427.9	1.1
PRE-TAX INCOME	4,851.7	12.6
INCOME TAX	2,212.5	5.8
AFTER-TAX INCOME	2,639.2	6.9
CASH FLOW	3,151.8	8.2

Appendix Table B-81. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Knit fabric finishing-hosiery products TYPE OF PLANT: Integrated TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (12.6 kkg/day)	
	($000)	(Percent)
SALES	28,728.0	100.0
COSTS:		
Textile Materials	14,364.0	50.0
Direct Labor	5,836.1	20.3
Indirect Labor	1,367.4	4.8
Other	2,612.9	9.1
TOTAL	24,180.4	84.2
CASH EARNINGS	4,547.6	15.8
LESS:		
Depreciation	574.6	2.0
Interest	217.2	0.8
PRE-TAX INCOME	3,755.8	13.1
INCOME TAX	1,708.4	5.9
AFTER-TAX INCOME	2,047.4	7.1
CASH FLOW	2,622.0	9.1

Appendix Table B-82. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Carpet finishing   TYPE OF PLANT: Integrated   TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (48.6 kkg/day)	
	($000)	(Percent)
SALES	32,803.2	100.0
COSTS:		
Textile Materials	16,401.6	50.0
Direct Labor	1,003.8	3.1
Indirect Labor	1,115.3	3.4
Other	9,424.4	28.7
TOTAL	27,945.1	85.2
CASH EARNINGS	4,858.1	14.8
LESS:		
Depreciation	874.8	2.7
Interest	434.0	1.3
PRE-TAX INCOME	3,549.3	10.8
INCOME TAX	1,613.4	4.9
AFTER-TAX INCOME	1,935.9	5.9
CASH FLOW	2,810.7	8.6

Appendix Table B-83. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing TYPE OF PLANT: Commission TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (9.4 kkg/day)	
	($000)	(Percent)
SALES	1,864.8	100.0
COSTS:		
Textile Materials	--	--
Direct Labor	367.7	19.7
Indirect Labor	229.9	12.3
Other	748.1	40.1
TOTAL	1,345.7	72.2
CASH EARNINGS	519.1	27.8
LESS:		
Depreciation	248.6	13.3
Interest	80.0	4.3
PRE-TAX INCOME	190.5	10.2
INCOME TAX	68.4	3.7
AFTER-TAX INCOME	122.1	6.5
CASH FLOW	370.7	19.9

Appendix Table B-84. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Stock & yarn finishing TYPE OF PLANT: Own yarn TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (9.4 kkg/day)	
	($000)	(Percent)
SALES	8,410.8	100.0
COSTS:		
Textile Materials	4,205.4	50.0
Direct Labor	893.6	10.6
Indirect Labor	157.3	1.9
Other	1,879.4	22.3
TOTAL	7,135.7	84.8
CASH EARNINGS	1,275.1	15.2
LESS:		
Depreciation	308.4	3.7
Interest	109.6	1.3
PRE-TAX INCOME	857.1	10.2
INCOME TAX	375.0	4.5
AFTER-TAX INCOME	482.1	5.7
CASH FLOW	790.5	9.4

Appendix Table B-85. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Nonwoven manufacturing TYPE OF PLANT: Not applicable TYPE OF DISCHARGER: Indirect (PSNS)

	Large	(56.7 kkg/day)
	($000)	(Percent)
SALES	4,800.0	100.0
COSTS:		
Textile Materials	12,000.0	25.0
Direct Labor	5,100.0	10.6
Indirect Labor	2,121.6	4.4
Other	18,644.0	38.8
TOTAL	37,865.6	78.9
CASH EARNINGS	10,134.4	21.1
LESS:		
Depreciation	2,880.0	6.0
Interest	1,024.4	2.1
PRE-TAX INCOME	6,230.0	13.0
INCOME TAX	2,846.6	5.9
AFTER-TAX INCOME	3,383.4	7.0
CASH FLOW	6,263.4	13.0

Appendix Table B-86. The textile industry, representative new source model plants' cost characteristics

SUBCATEGORY: Felted fabric processing TYPE OF PLANT: Not applicable TYPE OF DISCHARGER: Indirect (PSNS)

	Medium (4.4 kkg/day)	
	($000)	(Percent)
SALES	9,273.6	100.0
COSTS:		
Textile Materials	2,318.4	25.0
Direct Labor	1,168.2	12.6
Indirect Labor	881.6	9.5
Other	3,077.3	33.2
TOTAL	7,445.5	80.3
CASH EARNINGS	1,828.1	19.7
LESS:		
Depreciation	927.4	10.0
Interest	340.8	3.7
PRE-TAX INCOME	559.9	6.0
INCOME TAX	238.3	2.6
AFTER-TAX INCOME	321.6	3.5
CASH FLOW	1,249.0	13.5

APPENDIX C

DATA COLLECTION PORTFOLIO
(AND TRANSMITTAL LETTER)

Dear Sir:

The U.S. Environmental Protection Agency (EPA) is developing regulations for the textile industry as required by the Clean Water Act of 1977. To develop regulations which are sound, EPA needs a detailed understanding of the technical and economic condition of the industry. This requires the most up-to-date and accurate data we can acquire.

As part of our data gathering process, EPA sent a "308 Questionnaire" to your firm in April. This questionnaire requested certain financial and other data to be used by EPA and its contractor in the development of regulations.

To date, we have not received your completed questionnaire. The data you provide will be used to help us understand the potential economic impacts of regulations under consideration. Without this data, EPA may unknowingly set regulations which are economically infeasible, and which may substantially affect your company. Therefore a second questionnaire, identical to the one you received in April, is enclosed. It is important that you complete these questionnaires to the best of your ability. Since the questionnaire was sent to you, EPA has obtained approval by the Office of Management and Budget (OMB). The OMB number appears in the cover sheet and on the first page of the questionnaire.

We recognize that some answers may require estimates, since your information may not be kept in a format compatible with our request. In those cases, reasonable estimates are acceptable, as long as the assumptions and bases for your estimates are provided. We do not intend for you to spend excessive time or money responding to the questionnaire, but we do want reasonable answers based on your knowledge and on information easily available to you.

You may consider data requested in this questionnaire as confidential and sensitive to your business. EPA will handle your data in a confidential manner pursuant to 40 C.F.R. Part 2, Subpart B, if you mark the boxes on the cover sheet to the questionnaire denoting those responses which you wish handled confidentially.

The questionnaire you submit to EPA, and any other confidential data, will be kept in locked files and handled only by authorized EPA employees. The questionnaire will be coded. The cover sheet identifying the respondent will be separated and stored by EPA in a secured facility, and the coded questionnaire will be sent to EPA's contractor, Development Planning and Research Associates, Inc. (DPRA). DPRA, who is under contract to EPA to conduct the economic analysis, will compile and analyze the data. DPRA is obligated to handle all data designated as confidential in a confidential manner. When the analysis is complete, the questionnaires, and any confidential information generated during the course of analysis, will be returned to EPA where they will be stored in a secured facility.

Although information which you claim to be confidential will be treated by EPA as confidential, a third person may request access to the data under the authority of the Freedom of Information Act. In this case, you will be notified that a request has been made, and you will be able to provide further justification for continued confidential handling of your data. EPA will consider your comments before making a final determination of the information's confidentiality. If EPA determines that the information should be released, you will be informed in advance and may petition the courts to prevent release of the information. Please note that any data not claimed as confidential may be disclosed to the public without further notice to you.

In addition to the study being done by EPA, the American Textile Manufacturers Institute (ATMI), the Carpet and Rug Institute (CRI), and the Northern Textile Association (NTA) are jointly working to develop an industry position regarding the economic impact of these regulations. In order to facilitate this work, these three trade associations are requesting you to provide them with a copy of your response to EPA's questionnaire. This will allow EPA and the industry to work from the same data base. As the enclosed letter explains, once the completed letters are received by the trade associations, all identifying information will be removed and the questionnaire will be sent to their independent contractor with an assigned code number.

All information sent to EPA and marked confidential will be protected in accordance with our regulations. Since it is the Agency's position that a company loses its right to confidential treatment of business information once that information is disclosed without protection to a third party, any information sent to EPA as confidential cannot be protected unless the information is treated as confidential by the trade associations and their contractor. You will note however, that ATMI, CRI and NTA, by their letter, agree to keep confidential all information for which you desire such treatment, and have a signed agreement with their contractor which prohibits disclosure of the information to any other source. Please indicate, on the space provided on the cover page, if you are sending a duplicate copy of the completed questionnaire to one of the three trade associations.

Please return your completed questionnaire, in the pre-addressed envelope provided, within 14 days from receipt of the enclosed survey. As you were informed in April, EPA is making this request under authority of Section 308 of the Clean Water Act, which permits EPA to require the establishment, maintance, and provision of information necessary to develop a sound regulation. If you do not respond with a completed questionnaire to EPA within this 14-day period, you may be subject to enforcement actions authorized under Section 309 of the Clean Water Act.

Please be advised that Section 309(d) of the Federal Water Pollution Control Act, 33 U.S.C. §1319(d), provides, inter alia, that any person who violates Section 308 of the Act shall be subject to a civil penalty not to exceed $10,000 per day of such violation. In addition, Section 309(c)(1) of the Act, 33 U.S.C. §1319(c)(1), provides inter alia, that any person who willfully or negligently violates Section 308 of the Act shall be punished by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment of not more than one year, or by both. The liabilities under Section 309(c)(1) extend to responsible corporate officers.

If you have any questions regarding this letter or the enclosures, please contact the economics project officer, L. Jean Noroian, at (202) 426-2617. Your cooperation is important to us, to your industry, and most of all, to you. With your help, we are confident that the final regulations will best balance the needs of all concerned.

Sincerely yours,

Albert J. Erickson

Albert J. Erickson
Associate Deputy Assistant Administrator
Office of Water Planning and Standar

Enclosures

C-3

AMERICAN TEXTILE MANUFACTURERS INSTITUTE, INC

400 S. TRYON ST. WACHOVIA CENTER
CHARLOTTE, N.C. 28285

April 6, 1978

TO TEXTILE PLANTS PARTICIPATING IN
EPA ECONOMIC WASTEWATER SURVEY

The American Textile Manufacturers Institute, the Carpet and Rug Institute and the Northern Textile Association are participating with EPA in a long range research project to determine the textile industry's technical and economic capability for meeting the Best Available Technology Economically Achievable (BATEA) water pollution guidelines. This effort is separate from the overall review of regulations referred to in the accompanying EPA letter but is intended to complement the agency's program.

One phase of the project will be an evaluation of several advanced wastewater treatment technologies which might be used to meet the guidelines. The second phase will be an economic analysis of the probable costs and related impact on the industry from the use of these technologies. Approximately 24 textile plants are participating in the technical studies and the three trade associations are soliciting wide input from their members in the economic studies.

Because the guidelines are to be based on the "Best Available Technology Economically Achievable", it is especially important that the economic evaluations be on a wide data base which accurately represents the industry. You can assist in this work by sending us a copy of each completed questionnaire which you provide to EPA.

All plant identification information will be deleted upon receipt and coded before being submitted to our economics contractor, Dynamics Associates. We will maintain strict confidentiality of plant identification and have a signed agreement with Dynamics prohibiting their disclosure of this information to any other source.

If you consider it essential, you may delete the plant name and the address and insert your own code before sending the questionnaires to us. It will be important, however, that we have the company name, the name of the state where the plant is located and the name of a corporate contact.

Reproduced from best available copy.

Please send the questionnaires to one of the three trade associations at one of the following addresses:

American Textile Manufacturers Institute, Inc. Telephone: (704) 334-4734
Attn: O'Jay Niles
2124 Wachovia Center, 400 South Tryon Street
Charlotte, North Carolina 28285

Carpet and Rug Institute Telephone: (404) 278-3176
Attn: Barry Torrence
P. O. Box 2048
Dalton, Georgia 30720

Northern Textile Association Telephone: (617) 542-8220
Attn: Karl Spilhaus
211 Congress Street
Boston, Massachusetts 02110

Your cooperation in providing us with this information would be extremely helpful in conducting an industry-wide assessment of the economic impact of the BATEA requirements..

American Textile Manufacturers Institute, Inc.

Carpet and Rug Institute

Northern Textile Association

DATA COLLECTION PORTFOLIO
- TEXTILES -

FACILITY IDENTIFICATION

(1) Plant Name ____________________

Address of Plant ____________________

____

(2) Name of Parent Company ____________________

Address of Parent Company ____________________

____

(3) Name of individual we may contact concerning this Data Collection Portfolio

____

Telephone Number Area Code (______) Telephone No. ____________________

(4) The attached survey is applicable to those plants which generate process wastewater. Process wastewater can be defined as liquid wastes resulting from processes utilized in your plant which are discharged to your own treatment facility, to a municipal treatment facility, or to some other receiving source. If your plant does not generate wastewater, please check the following box ☐, complete questions (1) through (5) on this page, and return this page to EPA in the enclosed envelope. If your plant **does** generate wastewater, please complete the attached questionnaire and return it to EPA.

(5) If you are also sending a copy of your questionnaire responses to one of the industry associations, please check the following box ☐.

(6) To assert your claim of confidentiality, please check off the box corresponding to the questions, which, in the company's opinion, requires confidential treatment.

1☐ 3☐ 5☐ 7☐ 9☐* 11☐

2☐ 4☐ 6☐ 8☐ 10☐

NOTE: Upon receipt by EPA, this page will be separated from the remainder of the questionnaire so that data processing and use of the data is conducted on a coded basis.

Form Approved
O.M.B.
No. 158–R0160

For Use by EPA

Code Number ____________

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*The Clean Water Act specifically states effluent data are not subject to confidential treatment.

Form Approved
O.M.B.
No. 158–R0160

For Use by EPA
Code Number________________

Data Collection Portfolio
- Textiles -

To accurately assess the economic consequences of requiring the Textile Industry to meet certain water pollution limitations, it is essential to obtain current economic and financial data. As the discharge limitations will vary according to each plant's production process employed and discharge method, it is necessary to obtain data on an individual plant basis. For purposes of filling out this Data Collection Portfolio, a plant shall relate to one technically coherent economic unit at one location for which financial data are most readily available. A company is a business unit producing goods and services with one or more capital facilities combined under some form of entrepreneurial control. All other data shall be provided on a best estimated basis. Data should reflect 1976 or your most recently completed fiscal year for which data are available.

1. PRODUCTION INFORMATION: Below please indicate the amount of raw materials used in this mill in 1976 or the most recent fiscal year as well as the amount of products processed in this mill during that time.

PURCHASED RAW MATERIALS (include interplant transfers)	(pounds)
Wool	
• Grease wool	________
• Clean wool	________
• Wool top	________
• Yarn	________
• Fabric (Greige)	________
• Other________________	________
Cotton	
• Raw cotton	________
• Yarn	________
• Fabric (Greige)	________
• Other ________________	________
Man Made Fibers	
• Fiber	________
• Yarn (include filaments)	________
• Fabric (Greige)	________
• Other ________________	________
Blends	
• Yarn	________
• Fabric (Greige)	________
• Other ________________	________
Other (please specify)	
• ________________________	________
• ________________________	________
• ________________________	________

PROCESSED PRODUCTS (include interplant transfers)	(dollars)
Broadwoven Fabrics	
• Chiefly cotton	
Greige	________
Finished	________
• Chiefly Manmade	
Greige	________
Finished	________
• Chiefly Blends	
Greige	________
Finished	________
• Chiefly Woolen	
Greige	________
Finished	________
Women's Hosiery, except Socks	________
Other Hosiery	________
Knit Outerwear	________
Knit Underwear	________
Circular Knit Fabric	________
Warp Knit Fabric	________
Woven Carpets & Rugs	________
Tufted Carpets & Rugs	________
Yarn	________
Thread	________
Felt Goods	________
Lace Goods	________
Padding & Upholstery Filling	________
Coated Fabrics	________
Nonwoven Fabrics	________
Other (please specify)	
• ________________________	________
• ________________________	________

2. **PROCESS DESCRIPTION:** Please check the appropriate processes which apply to your operation.

______ Wool Scouring
______ Combing
______ Carding
______ Spinning
______ Slashing
______ Weaving
______ Knitting
______ Carpet Backing
______ Desizing
______ Scouring
______ Bleaching
______ Mercerizing

______ Carbonizing
______ Dyeing
______ Bonding and Laminating
______ Printing
______ Functional Finishes
______ Nonwoven Processes (Please Specify)
______ ______________________
______ ______________________
______ Other Processes (Please Specify)
______ ______________________
______ ______________________
______ ______________________

3. **PLANT DESCRIPTION:** Information provided should be for calendar year 1976 or latest fiscal year (year ended __________).

(1) How representative was this plant's production data during the year represented in this questionnaire as compared to the averages for 1971-1975?

About the same ☐
Better than average ☐
Worse than average ☐

(2) Approximate age of production equipment:

Age in Years	Percent of Total Production Equipment
(a) 0-5	______
(b) 6-10	______
(c) 11-15	______
(d) 16-20	______
(e) 21-50	______
(f) 50 or older	______

(3) Employment: Average number of

Production Employees ______
Non Production Employees ______

with production employees defined as hourly paid employees directly associated with production and non production employees defined as all other personnel at this plant (including supervisory and administrative).

(4) Organization:

(a) Is this company a
☐ proprietorship, partnership, or closely-held corporation
☐ public corporation

(b) Is this company a
☐ single-plant operation
☐ multi-plant operation

(c) For multi-plant operations:

Total sales of company from all textile products
☐ $100,000 or less
☐ $100,001 to $500,000
☐ $500,001 to $1,000,000
☐ $1,000,001 to $5,000,000
☐ $5,000,001 to $50,000,000
☐ Greater than $50,000,000

Total sales of company from all products (including textiles)
☐ $100,000 or less
☐ $100,001 to $500,000
☐ $500,001 to $1,000,000
☐ $1,000,001 to $5,000,000
☐ $5,000,001 to $50,000,000
☐ Greater than $50,000,000

(5) Plant capacity and utilization:

(a) Please indicate the number of hours __________ and days __________ in your "normal" work week.

(b) Days of operation in 1976 __________ days; in 1977 __________ days.

(c) Maximum rated plant capacity under normal work week:

__________ pounds textile and fiber material input per day

__________ square yards finished product per day

__________ other (i.e. pounds) __________ per day

(d) Percent of plants maximum rated capacity utilized in 1976 __________ in 1977 __________.

(e) Inventory turnover __________ times per year.

(f) What percent of your latest fiscal year's production was represented by commission work? __________ %

4. PRODUCTION AND INCOME DATA FOR LATEST FISCAL YEAR FOR THIS PLANT:

Data for latest fiscal year ending ____ / ____ / ____

(1) Poundage

Textile and Fiber Materials Input __________ lbs.

Production Output __________ lbs.

(2) Proportion of the above products which are goods which are transferred from this facility to another company-owned operating-facility __________ %

(3) Sales (or market Value of Production) $__________

(4) Costs (combine categories if necessary):

Textile and Fiber Materials $ __________

Other Production Materials $ __________

Direct Labor $ __________

Indirect and General Labor $ __________

Electricity $ __________

Other Energy (oil, gas, coal, etc.) $ __________

Depreciation $ __________

Interest $ __________

Taxes (except federal income taxes) $ __________

Other Costs $ __________

(5) Please indicate the annual cost of wastewater treatment.

Labor $ __________

Materials (chemicals, etc.) $ __________

Energy $ __________

Depreciation $ __________

Interest $ __________

Other (please specify) $

____________________ $ __________

____________________ $ __________

5. PLANT ASSETS: End of latest fiscal year (/ /)

(1) Cash and Receivables $ ________

(2) Inventories $ ________

(3) Fixed Assets (other than land): $ ________

	Gross	Net	Liquidation Value	Replacement
Building	________	________	________	________
Equipment	________	________	________	________

(4) Land (Availability and Value)

(a) Availability: How much land is available for construction of additional wastewater treatment facilities (Please Check)

	Now Own	Could Acquire
None	☐	☐
Less than ½ acre	☐	☐
½ - 1 acre	☐	☐
1-3 acres	☐	☐
More than 3 acres	☐	☐

(b) Value:

What is the book value of the land presently associated with this operation? $ ________

What is the approximate current value per acre of land in the vicinity of your plant? $ ________ per acre

(5) Capital Investment – total for last three (3) years–

Replacement of Equipment $ ________

Major Plant Expansions $ ________

Pollution Control and Safety $ ________

6. PLANT LIABILITIES AND EQUITY: End of latest fiscal year (/ /)

(1) Current Liabilities and Short Term Debt $ ________

(2) Long Term Debt

	Rate	Date Due	Amount
(a)	______ %	/ /	$ ________
(b)	______ %	/ /	$ ________
(c)	______ %	/ /	$ ________
(d)	______ %	/ /	$ ________
(e)	______ %	/ /	$ ________

(3) Owner's Equity (Book Value) $ ________

7. PLANT HISTORICAL DATA: Please give data for last five (5) fiscal years:

Year End	Pretax Profits ($000)	Total Assets ($000)	Total Sales ($000)
/ /	________	________	________
/ /	________	________	________
/ /	________	________	________
/ /	________	________	________
/ /	________	________	________

8. OTHER REGULATORY IMPACTS AND ASSOCIATED COSTS:

Describe briefly any Federal, State, or Local regulations and your planned response or progress already made.	Indicate Costs Incurred Over Last 3 Years		Estimate Anticipated Costs Over Next 3 Years	
	Investment Total	Operation & Maintenance	Investment Total	Operation & Maintenance
1.	$ ________	$ ________	$ ________	$ ________
2.	$ ________	$ ________	$ ________	$ ________
3.	$ ________	$ ________	$ ________	$ ________
4.	$ ________	$ ________	$ ________	$ ________

9. PLANT EFFLUENT CHARACTERISTICS AND DISCHARGE INFORMATION – 1976:

(1) During 1976 or your most recently completed fiscal year, what was your approximate average daily wastewater discharge? ______________ gallons/day

(2) Please indicate the approximate percentage of the total flow from each source:

__________ % Process-Related Wastewater
__________ % Boiler Blowdown
__________ % Non Contact Cooling Water
__________ % Sanitary Sewage
__________ % Cafeteria
__________ % Air Pollution Control Equipment
__________ % Other (Describe) ______________________________

(3) Please indicate method used to dispose of process-related wastewaters.

__________ Direct Discharge – Discharge of treated or untreated process-related wastewaters directly to a receiving body of water.

__________ Indirect Discharge – Discharge of partially treated or untreated process-related wastewaters directly to a Publicly Owned Treatment Works (POTW) via municipal sewer system.

__________ Other Discharge such as septic tank, evaporation lagoon, irrigation system, etc. Please explain briefly below.

____

____

(4) If your plant is a Direct Discharger, please indicate the following:

	Average presence (lbs. per 1,000 gallons)
BOD_5	______________
COD	______________
TSS	______________

10. PLANT WASTEWATER TREATMENT COSTS:

If your plant discharges wastewaters to a POTW, what were your wastewater treatment user charges?

	Total Cost	Cost per 1,000 Gallons
1975	__________	__________
1976	__________	__________
1977	__________	__________

11. **COMMENTS:** Please supply any other data or comments you feel may be helpful in evaluating the economic impact of effluent limitation guidelines on the Textile Industry (e.g. describe characteristics which result in an atypical expenditure for effluent controls).

Thank you for your cooperation. Please enclose this form in the accompanying envelope and mail directly to:

Mr. Anthony M. Montrone
U.S. Environmental Protection Agency
Office of Analysis & Evaluation (WH 586)
401 M Street, S.W.
Washington, D.C. 20460

* U.S. GOVERNMENT PRINTING OFFICE:1982 361-087/323 3570